REAUTHORIZATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

HEARING

BEFORE THE

SUBCOMMITTEE ON
COMMERCE, TRADE, AND CONSUMER PROTECTION

OF THE

COMMITTEE ON ENERGY AND COMMERCE
HOUSE OF REPRESENTATIVES

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CONTENTS

REAUTHORIZATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

THURSDAY, MARCH 18, 2004

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ENERGY AND COMMERCE,
SUBCOMMITTEE ON COMMERCE, TRADE,
AND CONSUMER PROTECTION,
Washington, DC.

The subcommittee met, pursuant to notice, at 10 a.m., in room 2322, Rayburn House Office Building, Hon. Cliff Stearns (chairman) presiding.

Members present: Representatives Stearns, Upton, Shimkus, Radanovich, Bass, Issa, Otter, Barton (ex officio), Schakowsky, Gonzalez, Green, McCarthy, Strickland, Davis, and Dingell (ex officio).

Staff present: David Cavicke, majority counsel; Kelly Zerzan, majority counsel; Jill Latham, legislative clerk; Jon Tripp, deputy communications director; and Jonathan Cordone, minority counsel.

Mr. STEARNS. Good morning, everybody. Today, we are here to discuss the reauthorization of the National Highway Traffic Safety Administration, NHTSA. We have two excellent panels with us here today to discuss the vast ranges of vehicle safety issues, and of course, I'm anxious to hear from everybody.

Today, safety sells cars. According to the 2002 J.D. Power and Associates U.S. Automotive Emerging Technology Study, 9 of the 10 top features most desired by consumers in their next new vehicle purchase are designed to enhance vehicle or occupant safety. As expected, as the demand for safety products increases, so will the supply. Car companies are responding to the call from consumers for safer vehicles. Despite their being more cars on the road than ever.

We continue to see the fatalities and injury rates decreased. We are light years from where we were 10 years ago and the future looks bright. But despite the innovations in safety technology, there is no doubt that more needs to be done. Every year, over 40,000 people, parents, children, husbands and wives, tragically die annually in automobile accidents. What is distressing is that many of these lives should never have been lost.

The single most effective strategy to prevent deaths on our national highways is a click of the safety belt. For instance, of the 8,407 people who were killed in single vehicle rollover crashes in 2001, a full 78 percent were not wearing their seat belt. Unfortunately, despite the fact that seat belts have been standard safety

equipment on cars since 1966, there are those who refuse or fail to simply buckle up and the costs are staggering.

Over the past 20 years more than 7,000 people were killed and over 100,000 injured annually, due to the failure to wear seat belts. It is estimated that these incidents have cost society nearly $20 billion, not to mention the emotional toll that has had on the families of those who were killed.

I applaud our Administrator, Mr. Runge, for making the increased use of safety belts a priority for NHTSA and pledge to assist in any way I can to further his goals.

Additionally, NHTSA is working on the issue of vehicle compatibility with the exponential growth of SUVs and minivans in the market, when these vehicles crash into passenger cars, the effects are dramatic. While most buy SUVs or similar vehicles to gain increased safety, few wonder what the impact will be on a smaller car. Thankfully, NHTSA is considering vehicle compatibility and continues to research the best way to frame the problem.

In addition, the auto industry has taken on responsibility and has entered into an agreement with the Insurance Institute for Highway Safety which we'll hear more about today. In this agreement, the auto industry has pledged to voluntarily adopt standards designed to address vehicle compatibility during front to front collisions and front to side crashes. This will ensure that advances in auto safety will be incorporated into the marketplace at a faster pace which will only result in increased safety and save lives.

I hope the Administrator will be able to tell us this morning about the prospect for NHTSA's reauthorization this year. Specifically, (1) does NHTSA plan to send reauthorization legislation to Congress? (2) When do you anticipate that legislation will be sent to us? And (3) what will be the main substantive provisions of the legislation?

I thank the witnesses for being here today and thank the staff for their help and I look forward to their testimony. Momentarily, we will have an opening statement from our distinguished ranking member, Ms. Schakowsky, so I'll ask her to provide it.

Ms. SCHAKOWSKY. I thank you, Mr. Chairman, for holding this hearing today on the reauthorization of the National Highway and Transportation Safety Act, and the challenges that are facing NHTSA as it works to immediately safety improvement responsibilities.

I would also like to recognize and thank my ranking member of the full committee, Representative John Dingell, for being here today and I want to welcome our witnesses who are here to share with us their views on how to improve safety, reduce fatalities and injuries and better protect children.

In 2002, 42,815 people died in motor vehicle crashes, the highest number in over a decade. Nearly 3 million more people were injured. Those numbers do not include children who were killed or injured in and around cars that were not in traffic. Centers for Disease Control, a CDC study, found that between July and June 2001, an estimated 9,160 children suffered nonfatal injuries and 78 children were killed in nontraffic accidents. Those numbers too, are cause for alarm. While they are not included in the official NHTSA statistics, they do count in families and we must do all we can in

order to eliminate accidents that are otherwise avoidable and to ensure that vehicles on and off the road are as safe as possible.

Increasingly, we're seeing problems on our roads that stem from the fact that people are buying bigger and tougher vehicles. In fact, half of new vehicles purchased are SUVs, vans and pickup trucks. This has led to an increased number of rollover accidents and crashes where bigger vehicles caused severe damage to people in smaller vehicles. Deaths in rollover crashes increased to a record 10,666 in 2002; 500 more rollover deaths than occurred in 2001. Rollover deaths accounted for one third of all passenger occupant fatalities in 2002.

We must approach this issue by working to prevent rollovers from happening as well as improving protections for people in cases where rollovers do occur.

I'm encouraged to hear that NHTSA is working to study crash avoidance technology. In addition, consumer advocates have proposed that we adopt standards dealing with roof strength, rollover resistance, seat belt design, crash ejection prevention, as well as design characteristics to reduce the threats posed by more aggressive vehicles. I believe we need to act in those areas.

I want to address the issue of our children's safety in and around cars. I've joined my colleague, Representative Peter King, in introducing H.R. 3683, the Cameron Gulbransen Kids and Cars Safety Act. One evening, 2 year old Cameron followed his dad out of the house as he went to move the family's SUV into the driveway. Cameron's father was not aware that his son was there and backed over him, killing him almost instantly. Unfortunately, this is not a lone occurrence. Our bill would require NHTSA to conduct a study of backover prevention technologies and to establish a data base to keep track of these types of nontraffic crash-related injuries and deaths.

Finally, this bill would address the issue of children being inadvertently killed or injured by power windows by requiring that manufacturers install child-proof auto reverse mechanisms. This technology exists and there's no reason it should not be used in all new cars. The standards in the Kids and Cars Safety Act, we well as rollover crash avoidance and other safety concerns are critical issues for the subcommittee to continue. I hope that this briefing will help to start a dialog among all parties involved so that we can come to some agreement on how to achieve our common goals of consumer protection and safer highways and safer cars.

Thank you.

Mr. STEARNS. Thank the gentlelady. Mr. Issa from California.

Mr. ISSA. I'll waive.

Mr. STEARNS. The gentleman waives. The distinguished ranking member of the full committee, Mr. Dingell?

Mr. DINGELL. Thank you for your courtesy. I commend you for the hearing and I'm delighted to see our panel here. I thank both panels for their presence and their assistance.

I am delighted we are holding this hearing on the reauthorization of the National Highway Traffic Safety Administration, NHTSA. This hearing is important. It will allow us to examine the resource needs of the agency and its current priorities. I've always viewed reauthorization of an agency which is for a fixed period of

time to be separate from decisions to change underlying laws which the agency administers. Should Congress during the reauthorization process consider writing new laws for the agency to administer, we should be guided by a number of facts and I'd like to address them now.

First, we must guard against regulating before the experts have had an adequate understanding of both the problem we seek to solve and the effect of the proposed regulations or solutions that may have a significant overall safety and public health consequence. I would remind my colleagues of the vast enthusiasm with which we went with regard to seat belts and with regard to the airbags. Seat belts turned out to be a good thing. Seat belt interlocks did not. Air bags turned out to, in fact, have a serious health consequence of a very adverse character. They kill people.

So it is essential that we look at these matters through clear eyes on the basis of sound experience. Time after time when NHTSA has been forced to regulate without a complete understanding of the problem and the ramifications of the proposed solution, the unintended consequences have been, as I've indicated, grave. Good intentions alone are not sufficient for regulating vehicle safety.

Second, we must not divert resources away from regulations and innovations that have the most potential to save the greatest numbers of lives. Every time Congress mandates that NHTSA promulgate a rule on a specific subject, there is less time and money for NHTSA to spend on other safety priorities. I would note these other safety priorities may, in real fact, and in the minds of experts, be much more important in terms of accomplishing the safety of the motoring public and others who are involved in highway usage and motor vehicle usage.

As information resources improve and as research gets better, we must allow the agency the chance to use its expertise and adequate responsibility and flexibility to determine what actions will save the greatest number of lives and prevent the greatest amount of pain and suffering to people.

Third, we must recognize that irresponsible regulation of the automobile is going to sacrifice important high paying manufacturing jobs at a time when this country is hemorrhaging jobs, we must take extraordinary care to ensure that new regulations are both appropriate and are implemented wisely.

The automobile industry, so that we can see what it does for us, is responsible for creating 6.6 million direct and spinoff jobs across the United States. It produces $243 billion in payroll compensation. It is an essential component of the economic well being, the national defense and all other things that are important to us as Americans. A manufacturer, and I would note, typically does not begin to realize a profit for a particular vehicle model until the third or fourth year of the model cycle. Much of the facts like this are not known to my colleagues and sometime our enthusiasm sweeps us in to things which are going to hurt an industry.

This industry has accomplished enormous amounts. If you look at a modern American automobile, it is now safer than it has ever been in history. If you look at that same automobile, it is also more fuel efficient than it has been and has a fuel efficiency that is dou-

ble the day before we had CAFE. It also is cleaner when it's going down the road at 50 miles an hour and is a new model than was a pre-1968 or pre-control vehicle. That tells us much about what the industry has accomplished in terms of billions of dollars in investment.

There are legislative proposals currently being considered that would require multiple redesigns of most models of cars and trucks across the fleet over a very short period of time. If this is accomplished, I think we can look forward to a significant period of economic downturn in the country and economic calamity in the automobile-producing areas and I would tell my colleagues that the automobile-producing areas are not just Detroit or places where there's a factory. They're wherever glass or computers or rugs or steel or nonferrous metals or high tech or computers are put together and other things.

The cost of such mandates, I would note, while unknown is going to be in the levels of billions of dollars. The effect of poorly planned regulations could be terrible with regard to unemployment and possible safety gains from on-going voluntary efforts could be placed in jeopardy.

Now there are times when legislative action is necessary. This committee worked well and harmoniously and diligently on the TREAD Act. That's a law that continues to yield fruit today. The early warning system established under TREAD helps NHTSA and manufacturers to identify problems sooner and recall affected vehicles faster due in part, to the success of the TREAD Act. Times have changed. NHTSA has established an aggressive agenda for vehicle safety that will be implemented on a responsible time table, one which could be met by all parties, for vehicles and manufacturers have responded. According to J.D. Power and Associates, 9 out of 10 most popular vehicle options now relate to safety. Every major manufacturer has joined forces with the Insurance Institute for Highway Safety to create an unprecedented voluntary agreement on vehicle compatibility that is enforceable by Federal regulations. That means how the vehicles are going to interact when they come together with a bang.

The same working group is also continuing its efforts on the issue of rollover avoidance and crash worthiness. Most of these arrangements are enforceable by Federal regulators, as I had said earlier. But we must not forget that in the end, human behavior remains the significant factor in reducing motor vehicle fatalities. In a nutshell, it is the nut behind the wheel, not the nut in the wheel that causes the accident.

There were approximately some 36,000 occupant fatalities in 2001. Yet, when you remove from that statistic accidents involving alcohol and unbelted passengers, the number drops by 75 percent. Over 17,000 occupant deaths were related to alcohol in 2002. That number continues to climb. This is obviously an outrage and one which we should address.

I would note that although seat belt usage is at a record high, there remains significant room for improvement. In rollover accidents alone, more than 75 percent of the passengers who died were not wearing their seat belts when the accident occurred. Whether it be belt minders, interlocks, Federal incentives or primary seat

belt laws we can and should do more to increase assured seat belt use.

Mr. Chairman, I thank you for holding this hearing. I thank the witnesses today for their assistance and I appreciate your courtesy to me and I yield back the balance of my time.

Mr. STEARNS. And I thank the distinguished gentleman and Mr. Upton, the gentleman from Michigan.

Mr. UPTON. I'll just stick my statement in as part of the record.

Mr. STEARNS. By unanimous consent, so ordered. Ms. McCarthy?

Ms. MCCARTHY. I will follow Mr. Upton's lead, Mr. Chairman, and submit my remarks for the record.

Mr. STEARNS. Mr. Otter?

Mr. OTTER. I'll put mine in the record.

[The prepared statement of Hon. C.L. "Butch" Otter follows:]

PREPARED STATEMENT OF HON. C.L. "BUTCH" OTTER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IDAHO

Mr. Chairman, thank you for the opportunity to examine the past actions and present goals of the National Highway Traffic Safety Administration.

Transportation has been a subject of main concern for Congress over the past few months. And as we discuss the effectiveness of our nation's highways and road systems, no issue is more important than safety. Our economy depends on a capable transportation system to transport goods and people from place to place, and yet every year there are tens of thousands of people killed in motor vehicle crashes—in fact, automobile accidents are the leading cause of death among young Americans today.

Since 1970 the National Highway Traffic Safety Administration has worked both to make cars safer every year and to teach Americans how to protect themselves from debilitating or even fatal car crashes. Through cooperation with the automobile industry, state legislatures, and consumers, driving on our nations highways and roads has become safer and many lives have been spared. These groups continue to work together to address the changes in the industry and on the roads.

I appreciate the open collaboration between the NHTSA and industry, as they recognize and work toward a common goal. However, I am concerned that the NHTSA reauthorization language included in the Senate transportation bill ignores the success of this teamwork by forcing overly aggressive mandates and arbitrary deadlines. As the House addresses this reauthorization I anticipate that we will take into account the efforts of industry, of the States, and of NHTSA to develop and successfully implement rules and standards for automobile safety. Today's hearing is the first step in that process. I look forward to hearing both from NHTSA and from industry members how they are addressing the needs of the ever-changing life on the road, and how we can work together to protect lives and make our transportation system safer.

Mr. STEARNS. Put it in the record. Mr. Davis.

Mr. DAVIS. I'll put mine in the record.

Mr. STEARNS. Same.

[Additional statement submitted for the record follows:]

PREPARED STATEMENT OF HON. JOE BARTON, CHAIRMAN, COMMITTEE ON ENERGY AND COMMERCE

Thank you, Chairman Stearns, for holding this hearing today on the reauthorization of the National Highway Traffic Safety Administration. I would also like to welcome Dr. Jeffrey Runge, NHTSA Administrator, to the Committee this morning.

Nearly everyone in this country owns a car, which is why automobile safety is so critical. Cars are part of the American culture, part of our way of life, and we have seen enormous advances in vehicle safety in the last 20 years. For instance, although every year there are increasingly more vehicles, of all sizes, on the road, every year the rate of accidents continues to decline. Every year seat belt use increases, and the American public are making their auto purchases with safety in mind. However, despite these great strides, there are still opportunities to make vehicles safer.

In its quest to make roads safer, NHTSA has focused on four primary areas: vehicle compatibility, rollover, seat belt use, and impaired driving. All of these issues are laudable goals that I fully support. I am pleased to see NHTSA spending its resources on the trouble spots that can produce the most benefit. The time and money of the Administration should be focused on the problems that can produce the greatest safety benefits for the highest number of consumers. The more lives that can be saved on American highways the better.

Along those lines, I am very pleased to hear that NHTSA intends to review each safety standard every seven years. This is a necessary process that should take place to ensure the best regulations are in place in light of advances in technology.

And certainly, NHTSA does not have to bear the brunt of pursuing safety advances—the industry should also step up to the plate, and it has in the area of vehicle compatibility. Working with the Insurance Institute for Highway Safety, and with annual progress reports to NHTSA, I have confidence that this program will get new and innovative technologies into the market faster than we've seen in the past. Consumers should not be forced to wait for a bureaucratic regulatory action, which is typically cumbersome and slow, to take advantage of new safety products. Particularly in an area, like auto safety, where delay can have such severe consequences, I encourage such partnerships and voluntary commitments.

As this Committee begins its process to examine NHTSA and its reauthorization, I understand that the other body has attached NHTSA reauthorization language to its highway spending bill. There is no question that these vehicle safety issues raise large questions and will have huge impacts on the American public. They should be thoroughly discussed and deserve to be debated. Therefore, I would prefer that NHTSA reauthorization move through the Committee process in regular order, but it appears that may not be possible. In light of that fact, this Committee plans to be a strong participant in any conference dealing with NHTSA and vehicle safety.

Thank you again, Chairman Stearns, for holding this hearing and I look forward to hearing from our witnesses.

Mr. STEARNS. With that Dr. Runge, we welcome you, Administrator, National Highway Traffic Safety Administration, for your opening statement.

STATEMENT OF JEFFREY W. RUNGE, ADMINISTRATOR, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Mr. RUNGE. Thank you, Mr. Chairman, Representative Schakowsky, Ranking Member Dingell, other members of the subcommittee, I really appreciate the opportunity to appear before you today to talk about motor vehicle safety. I'm happy to have the chance to update you on the activities at the agency.

NHTSA's mission, of course, is to save lives and prevent injuries. Motor vehicle crash is the leading cause of death for Americans from ages 2 through 34. In 2002, we lost 42,815 Americans to this epidemic. The associated economic costs seriously impact our Nation's fiscal health with an annual cost to our economy of over $230 billion.

At NHTSA, we focus our vehicle safety efforts on actions that offer the greatest potential for reducing those big numbers of lives and economic costs. The motor vehicle safety statute grants us the authority and the responsibility to issue motor vehicle safety standards for new motor vehicles and equipment. These standards must advance safety and be performance-based, objective, practicable and the test for compliance must be repeatable. Our professional staff includes experts from many disciplines and they are the world's leading experts in motor vehicle safety. All are dedicated to one singular mission, to reduce deaths and injuries on our Nation's streets and highways.

Since vehicle issues are the primary responsibility of this subcommittee, I will focus on these rulemaking activities. We've dem-

onstrated tremendous progress with our rulemaking procedures over the last 4 years. When I became Administrator, I set a goal of a 2-year duration from the start of the rulemaking process to the final rule. An audit released this month by the DOT Inspector General found that we have met that goal of 2 years or less. This has been accomplished with careful attention to timeliness, to milestones and internal deadlines that we impose on ourselves.

In order to ensure our rulemaking process is timely and data driven, we published NHTSA's first ever multi-year rulemaking priority plan this past summer of 2003. And it documents the agency's rulemaking activity through 2006.

Mr. Chairman, I have submitted copies of that for the record as well.

These rulemaking priorities were defined by careful examination of the data and through extensive discussions within the agency and with the public. Everybody in this country had the opportunity for input into this rulemaking priority plan. Once the rulemaking priorities were established, we then prioritized our research studies to make sure that those research needs that were there to support the priority rulemakings were also given the highest priority. We intend for this plan to be a living document and we will update it every year. We are also committed to reviewing all vehicle safety standards systematically over a 7-year cycle.

As I stated earlier, our highest priorities are given to those actions that have the greatest potential to reduce death and injury on the highway, irrespective of anybody's parochial or political concerns that are not supported by the data. Because of the necessity to adhere to this process, the Administration is opposed to legislatively mandated rulemakings that would displace the research and regulatory actions given priority under our deliberative and public process, all designed to produce the best and most cost-effective solutions to our most critical safety problems.

Arbitrary deadlines imposed with these mandated requirements could preclude vital research and analysis needed to avoid those unintended and dangerous consequences Representative Dingell talked about earlier. Furthermore, we have seen proposed mandates that include technical requirements that have never been proven to be viable. The public and the industry deserve regulations that are technically sound, practical, objective and repeatable. These can only be achieved when based on sound science and careful development of test procedures.

Mr. Chairman, I've detailed our priority rulemaking actions in my written testimony, which I've submitted for the record. I'd like to highlight just a couple of them for the committee, if I may.

The first is our side impact standard, which will address much of the problem with vehicle incompatibility caused by the collision of different sized vehicles, particularly passenger cars and SUVs. Of the 32,598 vehicle occupants killed in 2002, over 9,000 were killed in side impacts. In side impacts involving two passenger vehicles, an occupant of the struck vehicle was about seven times more likely to die than the occupant of the striking vehicle. The current safety standard for side impact is not adequate. For instance, it does not address injury to the head, even though 58 percent of side-impact fatalities involve the head. Therefore, improve-

ments in occupant protection in side impact crashes must be one of our most urgent priorities.

We have developed a proposed rule to upgrade this standard, which is currently under review at OMB.

Another lethal type of crash that we are addressing with high priority is rollover. Even though rollovers account for only about 2.5 percent of police-reported crashes, they account for about a third of all occupant fatalities. That's over 10,000 people a year including more than 60 percent of SUV occupant fatalities. Nearly two-thirds of rollover deaths are the result of full or partial ejections from the vehicle and nearly all of those were not wearing safety belts.

To improve the chances of surviving a rollover, in addition to the agency's tremendous work on safety belt use, we are working to reduce ejections and to enhance roof crush protection. We believe that our side impact upgrade will also lead to reductions in ejection, as the expected counter-measures for side impact might also be made protective in the event of a rollover. As our research matures, we will be considering appropriate rulemakings on these matters.

Longer term, Mr. Chairman, in addition to continuing efforts in crash worthiness, we will be exploring the new frontier in technology-assisted crash avoidance, including electronic stability control systems and driver assist technologies. We also need to undertake research and development in the fuel integrity of hydrogen-powered vehicles to support the President's Hydrogen Fuel Initiative and the FreedomCAR Program.

I urge the subcommittee to support these safety initiatives and our rulemaking goals, Mr. Chairman, as I outlined in our priority plan, which I'm submitting for the record. I'd be happy to answer any questions that you have.

[The prepared statement of Jeffrey W. Runge follows:]

PREPARED STATEMENT OF HON. JEFFREY W. RUNGE, ADMINISTRATOR, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Chairman Stearns, Congresswoman Schakowsky, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss various motor vehicle safety issues.

I want to express my appreciation for this Subcommittee's long-standing support of motor vehicle programs. Transportation safety is a top priority for Secretary Mineta and President Bush. Your work has allowed the National Highway Traffic Safety Administration (NHTSA) to advance motor vehicle safety. We are grateful to this Subcommittee for its continuing leadership and for scheduling this hearing.

NHTSA's mission is to save lives and prevent injuries. Motor vehicle crashes are responsible for 95 percent of all transportation-related deaths and 99 percent of all transportation-related injuries. They are the leading cause of death for Americans in the age group 2 through 34. In 2002, the last year for which we have data, 42,815 people were killed in motor vehicle crashes, up slightly from 42,196 in 2001. The economic costs associated with these crashes also seriously impact the Nation's fiscal health. The annual cost to our economy of all motor vehicle crashes is $230.6 billion in Year 2000 dollars, or 2.3 percent of the U.S. gross domestic product.

We focus our vehicle safety efforts on actions offering the greatest potential for saving lives and preventing injury. The motor vehicle safety law vests NHTSA with the authority and responsibility to issue motor vehicle safety standards for new motor vehicles and equipment that are performance-based, objective, practicable, and repeatable, and that advance real world safety. These standards reduce the number of motor vehicle crashes and minimize the consequences of crashes that do occur. NHTSA's professional staff includes engineers, statisticians, economists, lawyers and managers considered to be among the world's experts in applying their in-

dividual disciplines to the advancement of motor vehicle safety. All are dedicated to our singular mission of reducing death and injury on our nation's streets and highways.

We have demonstrated tremendous progress with our rulemaking procedures over the last 4 years. When I became Administrator, I set a goal of a two-year duration from the start of the rulemaking process to the Final Rule. A recent audit by DOT's Inspector General found that, based on a sample of significant rules for 2003, we have met our goal of two years or less. This has been accomplished with careful attention to timelines, milestones, and internal deadlines that we impose upon ourselves.

Last year we published the first NHTSA multi-year vehicle safety rulemaking priority plan. It sets forth the agency's rulemaking goals for 2003 to 2006. The rulemaking and supporting research priorities were defined through extensive discussions within the agency, taking into account the views we have heard over several recent years at public meetings and in response to rulemaking notices and requests for comment. We prioritized potential new rules and upgrades of existing rules according to the size and severity of the problems they address, and the best educated estimates of the cost and effectiveness. The agency works closely with the Congress and the public to define our priorities openly and with ample public comment.

We intend for our rulemaking priority plan to be a living document, and will update it annually. In addition, we are committed to reviewing all Federal Motor Vehicle Safety Standards systematically over a 7-year cycle. We decided that such a review is needed in light of changing technology, vehicle fleet composition, safety concerns and other issues that may require changes to a standard. Our regulatory reviews are in keeping with the goals of the Government Performance and Results Act, to ensure that our rulemaking actions produce measurable safety outcomes.

Because of this process, and the need to make these decisions based on current data, the Administration is opposed to legislatively mandated rulemaking actions that displace deliberative research and regulatory actions. The process that we have developed will produce the best and most cost effective solutions to our most critical safety needs. The deadlines imposed with mandated requirements can preclude the completion of necessary research and force premature judgments or the adoption of incomplete or only partially developed solutions.

Furthermore, we have seen proposed mandates that include technical elements that have not been proven viable. Several decades of vehicle safety rulemaking have demonstrated that quality data and research produce regulations that are technically sound, practicable, objective, and repeatable. Our rulemaking priority plan was carefully considered, in the context of concomitant research needs, and I ask for your support in our pursuit of its objectives.

The overall safety priorities set by our agency at the outset of this Administration are increasing safety belt use, reducing impaired driving, addressing vehicle crash incompatibility, reducing rollovers, and enhancing our data systems. Last year, we carefully studied these objectives and developed and published a roadmap for achieving them. This Subcommittee has jurisdiction over the motor vehicle safety law, which is central to our objective of reducing deaths and injuries associated with crash incompatibility and rollover.

NHTSA's priority rulemakings for the immediate future reflect our priorities. These include enhanced side crash protection, preventing occupant ejection in rollovers, and upgrading our standards relating to roof crush, head restraints, seat back strength and door locks. Our longer-term research priorities include a number of potential advances in crash avoidance, including electronic stability control systems and driver-assist technologies. We have integrated our rulemaking priority plan and our research plan to ensure that, as rulemaking becomes necessary to advance safety in the future, we have the research to support it.

In all of our efforts, we recognize the vital role that complete and precise data play in identifying safety problems. With that in mind, we are evaluating the important advances that electronic data recorders can add to our crash data and our ability to assess safety needs and benefits.

I would like to turn, now, to a discussion of some of the specific actions we are taking in accord with our rulemaking priority plan, against the backdrop of the safety problems we must address.

Of the 32,598 passenger vehicle occupants killed in 2002, 9,197 were killed in side impacts. In side impacts involving two passenger vehicles, an occupant of the struck vehicle was about 7 times more likely to have been killed than an occupant of the striking vehicle. It's not hard to see why preventing deaths and injuries in side-impact crashes is one of our highest priorities.

We have developed a notice of proposed rulemaking upgrading our side-impact standard. That proposal is currently under review at OMB. We estimate that this

upgrade would prevent many hundreds of deaths annually in these types of crashes. We hope to publish that proposal later this spring.

Rollover crashes account for a substantial percentage of the fatal crashes in the country. Even though only 2.5 percent of crashes are rollover, over 10,000 people die each year in rollovers. This is almost a third of all passenger vehicle occupant fatalities and more than 60 percent of SUV occupant fatalities. The data show that nearly two-thirds of all rollover deaths are the result of full or partial ejections from a vehicle, and nearly all of these are unbelted.

We recently started dynamic testing of vehicles as part of our new rollover resistance rating system in accordance with the TREAD Act. Testing and reporting of those results began this year, as part of our New Car Assessment Program (NCAP).

We have already noticed improvements in vehicle designs and in safety ratings. Manufacturers strive to obtain high safety ratings under NCAP, because so many consumers rely on this information in making their vehicle purchasing decisions. We have seen an increase in vehicle manufacturers using NHTSA's star-rating information in their product advertising. An informed public will be an effective catalyst for improved rollover resistance. We recently introduced a new web site, www.safercar.gov, to enhance consumers' ease of use and accessibility of the information.

To improve the crashworthiness of vehicles that roll over, we are working on improved ejection mitigation and roof crush protection. Even as NHTSA is upgrading our side impact standard, all of the major automobile manufacturers have committed over time to ensure that their vehicles meet certain testing criteria in side impact. Those testing criteria are intended to encourage the installation of side airbag curtains that protect against brain injury in side impact crashes. An additional benefit of many side airbag curtains is that they prevent ejections, which are very lethal.

In order to realize maximum benefits from side curtain airbags, they must deploy in a rollover. The agency will develop a plan to evaluate rollover sensors in full-system tests later this year. We anticipate issuing proposals for new rulemakings as our research matures.

In addition to the attention we are giving our rollover and compatibility priorities, we also intend to bring to the Congress some additional important safety initiatives that I would highlight. We believe the Secretary of Transportation should be authorized to participate and cooperate in international activities to enhance motor vehicle and traffic safety. This would provide for NHTSA's participation and cooperation in international activities aimed at developing the best possible global safety research and technical regulations. Through participation in these international efforts, the United States will combine its motor vehicle safety initiatives with those of other countries, to ensure a comprehensive approach to motor vehicle safety and to promote cost-effective deployment of safety technologies.

A second area is our need to expand activities in crash avoidance. The most significant vehicle safety initiatives in the future will be based on technology that will avoid crashes, rather than our traditional emphasis on crashworthiness. This would include evaluations of crash avoidance technologies such as electronic stability control, telematics, alternative braking, vision enhancement systems, collision avoidance systems and lane departure warnings.

We anticipate that our research into these and other driver assistance technologies will reach significantly beyond the scope of current agency research and development activities. The rapid advance of these technologies will radically change the design and performance of automobiles over the next 10 years and, coupled with the aging driver population, present unique research challenges in human factors engineering. Our goal is to hasten the introduction of vehicle-based driver assistance technologies into the marketplace while ensuring their safe performance across all demographics, through the development of standards, voluntary guidelines, or consumer information. In doing so, we will have to be mindful that with the proliferation of new technologies comes the potential for increased driver distraction.

A third new area is our need to engage in research and development in fuel integrity of hydrogen powered vehicles. This includes risk assessment studies, the development of test and evaluation procedures and performance criteria and the development of suitable countermeasures.

This safety initiative would support the President's Hydrogen Fuel Initiative and the FreedomCAR Program. In particular, the research program would investigate the safety of the power train, the vehicle fuel container and delivery system, the onboard refueling system, and the full vehicle system performance. This research would evaluate leak detection systems, determine the effectiveness of safety systems, assess fire potential and flammability, and evaluate external hazards to these systems. The onboard refueling system-related research and performance tests

would evaluate fuel leakage, examine sparking and grounding conditions of the refueling system, and examine conditions under which fire could occur. The full vehicle systems research and performance testing would include crash tests to identify safety issues associated with the existing Federal Motor Vehicle Safety Standards and new safety standards, evaluate performance of leakage detection systems under crash and normal operating conditions, and identify post-crash and special requirements for emergency medical services.

I urge this Subcommittee to support these important safety initiatives and our rulemaking goals as outlined in our priority plan, which I'm submitting for the record. I will be glad to answer any questions you may have.

Mr. STEARNS. Thank you, Dr. Runge. Let me get right to the gist of our concern.

Dr. Pittle, in his testimony, argues that NHTSA works best when it has congressional mandates and you've referenced in your testimony that you do not believe that legislated, regulatory mandates are wise. So I guess the question is we have out of the Senate, we have a bill, the language reauthorizes NHTSA, it was talked about as being part of the transportation bill.

I guess the question is do you support that bill that came out of the Senate on reauthorization? Why or why not and what specifically are the problems with that bill?

Mr. RUNGE. Mr. Chairman, there are some great things in the Senate bill. The thing that will make the most difference in saving lives, in the Senate bill right now, is the incentive for primary safety belt laws that was in the President's safety legislation, which rewards States with very large incentives for passing primary safety belt laws. We lose 7,000 to 9,000 people a year because they're not belted, and even though we're at 79 percent, it's the proportion that are not yet belted that are the riskiest drivers, the most likely to drive impaired, the most likely to have a crash and most likely to get killed. So that's a very important provision.

What we have problems with are the inflexible mandates that are put into the bill that will basically reset our priorities for the next 6 years. The mandates are permanent. They can't be steered where the research goes. They're inflexible.

Mr. STEARNS. They cannot be steered where research goes?

Mr. RUNGE. Right. We learn important things during the research and regulatory process that might change your approach or your time table and it's important that we get it right. Representative Dingell said earlier very well that there are always unintended consequences and until we begin to look at the effects of vehicle-based technologies in research, we don't really know the rulemaking direction that we want to take.

Moreover, the Senate bill has some very specific technologies mandated that we've not really shown to be viable yet. You know, the Senate has the same mission that we have. It's to save lives. We differ about the process about how we really want to solve a problem with 15-passenger vans, for instance, or whether we want to mandate a specific technology in 15-passenger vans. We want to solve the problem. Wherever the technology leads us is——

Mr. STEARNS. But you're saying within the bill, he's mandating these technologies which, in your opinion, today are not viable and so this is going to ask you to develop a program on something that doesn't work?

Mr. RUNGE. That may not work.

Mr. STEARNS. May not work, right.

Mr. RUNGE. From our best knowledge right now, a lot of the things that are in those mandates look very promising.

Mr. STEARNS. And the one before that that bothered you, the mandate before that, tell me that again, it's not registering. You said before the technology mandate, there was another mandate in there?

Mr. RUNGE. The primary safety belt?

Mr. STEARNS. Yes.

Mr. RUNGE. That's actually a great thing that we very much support.

Mr. STEARNS. So you support that one?

Mr. RUNGE. Yes sir.

Mr. STEARNS. So is there anything else in that reauthorization that you don't like besides the technology mandates which are not viable?

Mr. RUNGE. I think as far as this subcommittee is concerned with respect to vehicle mandates, interestingly, there are a bevy of them. Many of them we are already working on, but the answer is no.

Mr. STEARNS. Okay, so Mr. Pittle says we need to have congressional mandates. Do you agree with that?

Mr. RUNGE. I think——

Mr. STEARNS. Should we step in in the reauthorization bill and put a lot of mandates in?

Mr. RUNGE. There's no need to do that at this time for the things that are contained in the Senate bill.

Mr. STEARNS. Okay. You know, some of the young drivers between 16 and 20 and I've had three boys all through automobiles and so forth have had the normal crashes and things, what could NHTSA do and I'm not sure there's an answer to this question, for these young people, so many of them who do not wear seat belts and we have these tragedies claiming lives of these young people. In fact, we've had Members of Congress, their sons, they've died in automobile accidents and I think father and parents were all wondering what can we say to our children, what can we do and what can your agency do that involve crashes with young people, 16 to 20?

Mr. RUNGE. This group of people is a very risky population. They're the least experienced drivers. In fact, a new driver has about a—a quarter of new drivers have a crash in their first 2 years of driving. We are studying the issue of licensing. We have research that demonstrates that graduated licensing, meaning a step-wise licensing process is again State law, is very effective. North Carolina and Michigan both have shown a 25 percent reduction in crashes in their teen driving population with driving with a graduated law.

We are working with State legislatures with the NCSL and hopefully can cajole State legislators into graduated licensing laws. Strict alcohol enforcement, the approach to underage drinking and separating the drinking from the driving task is also very important. But first and foremost, this is a parental responsibility and we want to give parents the right information that they need to be parents. One of those, in fact, is vehicle choice. We have a new car assistant program which rates vehicles by stars and they're not all

created equal. They're as safe as they've ever been, but typically a young person and in my own family my 17-year-old drives a 1994 vehicle. Well, that's sort of counter intuitive. He should be driving my 2001 and I should be driving the 1994, but that's not how it works in families. So we want people to exercise good vehicle choice and be parents as well.

Mr. STEARNS. My time has expired, but you, the three questions I gave in the opening statement, does NHTSA plan to send a reauthorization is yes?

Mr. RUNGE. Yes.

Mr. STEARNS. And when do you anticipate that being sent?

Mr. RUNGE. It can be sent any time, Mr. Chairman, and we should have it over here for you next week.

Mr. STEARNS. That would be good. I think you've outlined you can, some of the main things within that as other members talk to you. So with that, I'll ask the ranking member.

Ms. SCHAKOWSKY. Thank you, Dr. Runge. A couple of, a number of questions, but one you just said, for example, that for 15-passenger vans that the Senate bill mandates a certain procedure. I'm looking at the language. It says that NHTSA shall evaluate and test the potential of technological systems, particularly electronic stability, control system and rollover warning systems to assist drivers in maintaining control of 15-passenger vans. I mean it doesn't seem to me that that is such a restrictive requirement. The goal here is to assist drivers in maintaining control of 15-passenger vans. I would take issue with your characterization that it leads you in the wrong direction.

Mr. RUNGE. Thank you, Representative Schakowsky. We have a 15-passenger van plan at NHTSA that we developed last year that involves problem identification, consumer information and education, counter measure research including electronic stability and control, whether or not we can actually put these through the same fishhook maneuver that we used for the NCAP test and then finally, vehicle countermeasures, including 15-passenger vans in certain appropriate rulemakings.

Ms. SCHAKOWSKY. I'm not suggesting that you're not addressing it. I'm just saying that your characterization of what was required in the Senate bill, I don't think is so restrictive as to be even inconsistent with what you say you're already planning to do.

But let me ask another question. In an article in USA Today on February 25, you cited as being worried that "some ways to strengthen a roof"—this is about rollover technology—"strengthen a roof required to be higher which can increase the chance of rollover." I'm just wondering if there's any study or other research that would substantiate your concern and are you saying that there is no way to simultaneously address roof strength and rollover protection?

Mr. RUNGE. I'll answer your second question first. Absolutely, there are ways to strengthen roofs without increasing the risk of rollover and we feel sure of that. With respect to the first thing, Ms. O'Donnell used the word "higher" in that article. I don't think I ever said the word "higher". What I said to her is that one could strengthen a roof inappropriately and raise the center of gravity by putting a lot of weight up high, which would absolutely increase

the rollover risk. So what we do with one technology, we don't want to cause an unintended consequence with the other. We are going to come out this year with a proposed rulemaking for a better roof crush standard than the one we have right now. We are on the case. So again, legislative mandates are fine when we have a crisis like TREAD addressed, but in the every day course of our normal rulemaking priorities, we believe that an open, public process is much better than specific inflexible legislative mandates.

Ms. SCHAKOWSKY. Although even on that point, there are ways to lower the center of gravity to compensate for additional roof height. That wouldn't exclude the notion that raising the height of the roof would be a positive thing, right?

Mr. RUNGE. That would be correct. Again, through deliberative research, careful—again, we don't make vehicles at NHTSA. The auto makers make vehicles.

Mr. STEARNS. Right.

Mr. RUNGE. Thank God, we don't have to make them or sell them. So a lot of what we mandate paints the manufacturers into a certain corner that they have to then engineer their way out of and we want to make sure that we don't cause harm as well.

Ms. SCHAKOWSKY. Let me ask you another question. You know Representative King and I have the Kids And Cars Safety Act that requires safety standards, power windows, safety child switches for auto reverse on the windows, auto reverse technology, etcetera. And in Tuesday's Washington Post, you said that there isn't enough nontraffic fatal and injury crash data being collected, but you question the figures supplied by a national safety group that talks about backover deaths and the window problems.

If you say you don't have the data on the nontraffic crashes, how do you know that the figures that were supplied by the organization called Kids and Cars and backover tragedies are too high?

Mr. RUNGE. Our staff has met with the leader of that safety group, and they meet regularly with all these safety groups who have these issues and they've gone over the data and they have some concerns about the numbers that have been given. But you're absolutely correct, we realized last year that we needed additional data on nonroad fatalities and injuries and our statisticians set about trying to figure out how to do that accurately.

We have been reviewing national vital statistics looking at death certificates and I believe that report should be out shortly, where we're looking at every single fatality. And if the medical examiner or the physician who does the death certificate codes it as having happened related to a motor vehicle, they're going to pull every single one of those and look at them and categorize them.

It takes manpower to do that and they think it's important enough to do that and so do I.

Ms. SCHAKOWSKY. So you will be collecting data?

Mr. RUNGE. Yes ma'am.

Mr. STEARNS. The gentlelady's time has expired. The gentleman from Michigan.

Mr. UPTON. Thank you, Mr. Chairman. Welcome, Dr. Runge. We appreciate your appearance today. I want to thank you for implementing the TREAD Act the way that you have and I know that just in the last month or so the word came out on yet another tire

recall that clearly will save lives. Because that recall is a direct result of the regulations that were promulgated from the act of our committee getting it through after the Firestone mess from several years ago. So I want to thank you on behalf of lots of people who otherwise have ridden on those tires.

I'm just curious to know if you've had any count yet in terms of the tires that have actually been submitted back to the dealer, to the tire dealers and how many have been replaced up to this point?

Mr. RUNGE. No sir, I don't have that information. This occurred actually less than 4 weeks ago. Our compliance people will begin to get information from the manufacturers in due time. I can't recall what that time course is.

Mr. UPTON. If you could just make it public to the committee at the appropriate time, I certainly would appreciate it.

I want to go back to something that you said in your statement, particularly on SUV safety where I think you said that a third of all the deaths in SUVs have been those folks that died wear a result of full or partial ejection, in other words, they were not wearing their seat belt. I know most States, I think, it's my understanding that most States do have mandatory seat belt laws, otherwise they'll lose their highway money. How many States don't have a mandatory seat belt law, do you know?

Mr. RUNGE. I think for Michigan where you do have a first rate safety belt law, you don't have a problem.

Mr. UPTON. I would note that part of the reason that we've done so well is at least in my family we have a fine and that fine just got elevated from—my son is 12 and he has an allowance of $6 so we've elevated the fine from what once was a nickel to $1 and now it's $2 last week because of the new fine. It seems to work pretty well, but I know Michigan does have a mandatory seat belt law, as the Upton family does as well. But how many States don't have a mandatory seat belt law?

Mr. RUNGE. Twenty-nine States have a safety belt law that prohibits a police officer from pulling a motorist over unless they're doing something else wrong. We refer to those as secondary laws and those have about an 11 percentage point difference in compliance when compared to those States with the law like Michigan's where one can be pulled over.

Mr. UPTON. So Michigan, I know is a primary law State, so how many States have primary laws?

Mr. RUNGE. Twenty now.

Mr. UPTON. Twenty.

Mr. RUNGE. Illinois and Delaware just passed, so 20.

Mr. UPTON. So 20 have a primary law and 29 have the secondary law, so one State does not. Is that State New Hampshire?

Mr. RUNGE. It would be, sir.

Mr. UPTON. That's what I thought. That was my understanding.

Mr. RUNGE. Now I should say for the benefit of your colleague——

Mr. UPTON. I have just one question and then I'll let you respond. What is the percentage of—are those folks in New Hampshire, do they have a higher either death rate in car accidents or injury rate that could be tied back to the lack of a seat belt law or any law?

Mr. RUNGE. That's a great question. There are many reasons why a State has a high or a low fatality rate. New Hampshire is doing a lot of things very well. The three things that determine whether you're going to die in a crash, basically, if you can lump this into three, are safety belts, alcohol and speed. Road conditions are also an issue. The slower one drives, the less chance you have to have velocity squared and have a lot of energy delivered to your body. So what we see in all the New England States where there's lots of snow and inclement weather is a fairly low fatality rate compared to other States in the South, for instance.

Mr. UPTON. But what are the numbers as it relates to New Hampshire?

Mr. RUNGE. I can't tell you what their fatality rate is right now, but I'll be happy to give that to you.

Mr. UPTON. I'd appreciate that. It would be helpful. You know they brag about their syrup up there, but I still think the Michigan stuff is better.

The last question I have is as it relates to the Senate bill, I know that they have quite a few dates that are imposed, mandated rulemakings. I'm just curious, if the Senate bill became law, do you think NHTSA would have trouble or the industry would have trouble with the number of these dates and if so, which ones? I know there's a number of different rulemakings. I think there are 10 major mandated rulemakings. As we work through the TREAD Act and again those, as I recall, they had not, the tire ratings had not been updated since the 1960's. I would just be curious to know how you think NHTSA would be able to move these new rulemakings with the time table that was laid out by the Senate. Which ones would you have trouble with?

Mr. RUNGE. If I can give you sort of a comprehensive answer about that first. As I said in my statement, we have a commitment, which is a new commitment to review all rules on a 7-year cycle. We will not have any more 1968 rules that have not been reviewed any more.

Now having said that, a lot of the mandates in the Senate bill requires us to look at technology and so forth and those are less problematic than those which actually require an NPRM or a final rule by a certain date. For instance, the mandate regarding aggressivity, how aggressive a vehicle is and that it should be included in the NCAP ratings. We are in the middle of research looking at how we are going to gauge aggressivity and this has to do a lot with the barriers that are available, the load sensors that are available in the barriers, how we interpret the force through the vehicle.

We are at a very early stage of research and while it may be a great idea, as I said before, we have to have tests that are perfectly repeatable so that the manufacturers can actually know when they make a vehicle how it's going to rate. And we have to be able to do it the same way every single time. So while it may be a terrific idea having an NPRM for January 2007, it also may be a terrible idea, but we won't know that until we finish the research. So once it's in law, it's inflexible and we have to respond.

Mr. UPTON. It's probably a little premature for some of these rulemakings to have the force of law without you having enough scientific knowledge to proceed. Is that right?

Mr. RUNGE. That's correct. It may turn out to be the best idea in the world.

Mr. UPTON. And that's one example. Can you provide, again I'm watching my clock expire here, if you can provide us with some of those areas where you think it would be difficult as we begin to work with the Senate and I'm getting legislation moving and obviously get to conference, I know that we'd all appreciate that.

With that, Mr. Chairman, I yield back the balance of my time.

Mr. STEARNS. Time has expired. Mr. Dingell?

Ms. SCHAKOWSKY. If I could?

Mr. STEARNS. Yes.

Ms. SCHAKOWSKY. Excuse me, Mr. Chairman, if I could ask unanimous consent to put in the record the testimony of Public Citizen and also of the Advocates for Highway and Auto Safety.

Mr. STEARNS. By unanimous consent, so ordered. Mr. Dingell?

Mr. DINGELL. Mr. Chairman, thank you. Dr. Runge, congratulations on an excellent statement. I assume that you're familiar with the agreements between the automobile industry and the Insurance Institute for both compatibility and side impact airbag standards. Will these agreements help NHTSA in its work on these issues?

Mr. RUNGE. Yes sir, they will.

Mr. DINGELL. Will you have the expertise and an opportunity to review them and see whether they are, in fact, good or will you not?

Mr. RUNGE. Yes, this is a real success story. And I appreciate your bringing that up.

Mr. DINGELL. Thank you. Doctor, even if there's more work to be done on these issues, do voluntary agreements such as compatibility and side impact airbag standards make vehicles safer, more quickly than just by regulation issued by you alone?

Mr. RUNGE. It's really clear that the industry can move much faster than the regulatory process can and as I said, as I've said on numerous occasions, we have a duty to proceed down our own track. There's a relatively small community in this country of vehicle safety researchers and they all sort of know what each is doing. So as the knowledge advances, the odds of converging on the same target get a lot better.

We will proceed down our track for side impact protection and for compatibility protection and as the industry does, I'm sure that they will share with us what they're doing and it really does help us in our rulemaking.

Mr. DINGELL. Thank you, Doctor. Now the manufacturers have agreed to share compliance data with NHTSA. This will enable the agency to monitor such manufacturers for compliance. Is it true then that you will know if automobile manufacturers are complying with these voluntary standards?

Mr. RUNGE. To the extent that they submit the data, yes sir, that will help us out.

Mr. DINGELL. But they will produce that data, will they not and you have the power to insist that they do so?

Mr. RUNGE. Where it's a voluntary standard, for instance, if we look back at the 1998 side airbag working group that they formed, we recently asked them to define for us the numbers of side airbags that actually conform to that voluntary standard and I've not seen the results of that, but I'm sure——

Mr. DINGELL. Do you have any reason to believe they will not be cooperative in providing the information that the agency needs?

Mr. RUNGE. No sir, not at all. Just the opposite. I think they will be cooperative.

Mr. DINGELL. Thank you, Doctor. I note that NHTSA is beginning to work on rollover prevention crash worthiness. Would voluntary standards produced through a similar process be helpful to NHTSA on these issues?

Mr. RUNGE. We have spoken with the Alliance and I would very much appreciate their getting to work on the rollover, on a voluntary rollover standard as they have with their side-protection and compatibility. They've not done so yet, but I think it would be a welcome advance.

Mr. DINGELL. Now Doctor, if we were to dramatically reduce the occurrence of alcohol-related incidents and dramatically increased the use of seat belts, isn't it true that we would reduce our fatalities by about 75 percent?

Mr. RUNGE. I can't tell you that 75 percent number, Mr. Dingell. It would be a lot. It would be a lot.

Mr. DINGELL. Doctor, how many enforcement actions did NHTSA bring against car manufacturers that sold replacement tires that did not comply with NHTSA requirements? If you don't have that information present, we'll ask you to submit it for the record.

[The following was received for the record:]

NHTSA has not brought any enforcement actions against car manufacturers for selling replacement tires that did not comply with agency requirements. We also are not aware of any car manufacturers that sell replacement tires. However, NHTSA does have an active, ongoing compliance test program for tires sold as replacements in the United States market. For fiscal years 1997 through 2004, NHTSA performed compliance testing on 1,719 replacement tires, and has documented one failure. As a result of this testing, the agency initiated one investigation that closed without action.

Mr. RUNGE. Thank you, sir.

Mr. DINGELL. A similar question with regard to actions brought by NHTSA against parts manufacturers that sold replacement lighting processes or rather lighting products that did not comply with NHTSA safety regulations. If you don't have that information, would you submit it?

Mr. RUNGE. Absolutely.

[The following was received for the record:]

The following table summarizes the investigations NHTSA initiated, between January 1, 1997 and March 31, 2004, with regard to replacement lighting equipment, and the result of those investigations.

Total # of Investigations	# of Pending Investigations	# of Recalls	Stopped Sales (Dealers)	Civil Penalties	Closed w/o Action
48	4	29*	13**	$660,000	7

*Certain investigations resulted in multiple recalls.

**In today's marketplace, it is often difficult to determine the manufacturer of lighting products until after an investigation is underway. Although dealers are prohibited from selling noncompliant products, they are not required to recall.

Mr. DINGELL. Doctor, at least two witnesses on the second panel will discuss a growing problem in the industry, foreign manufacturers selling replacement tires and auto parts that do not comply with U.S. safety standards. To make matters worse, many of these products are labeled as if they did comply with our standards. This places our domestic manufacturers at an economic disadvantage. Does this constitute a danger to vehicle safety?

Mr. RUNGE. I think the answer to that question will come when we work with the industry, with the Customs Service, anybody that we have to work with in order to identify those tires and actually do compliance.

Mr. DINGELL. Common sense tells us that it is a problem and it does impose risks on American public, does it not?

Mr. RUNGE. There certainly is a risk.

Mr. DINGELL. Doctor, does the NHTSA need new powers to address this? Should you be able to seize falsely marked parts and equipment that says it meets standards when, in fact, it does not? Food and Drug has a similar power. Department of Agriculture has a similar power. What powers do you have and what do you need to address this concern?

Mr. RUNGE. I think that we probably already have the power to do so. I'll check with our lawyers to make sure.

Mr. DINGELL. I would be more comfortable if you could tell us today or if you would be able to submit it to us at a later time?

Mr. RUNGE. We will check into our authority and let you know. I will say that this is an issue that we've talked about, particularly the tire manufacturers association, the rubber manufacturers association and we also agree that we need to get a handle on this problem. If it's a problem, let's jump on it. I've asked them, in fact, if they have information that's out there, we would like to have it. We don't have it right now.

Mr. DINGELL. We don't have the information. How are we going to get it?

Mr. RUNGE. Well, you might better ask Mr. Shea in the next panel, but he's told me that he believes that they can give us that information. They apparently have it.

Mr. DINGELL. I will ask that you communicate with us on these matters and also that you inform us of the powers you have to address it, to collect the information and the powers you need to bring this problem to a halt.

Mr. Chairman, I thank you.

Mr. STEARNS. I thank the gentleman from Michigan. The distinguished Chairman of the Full committee, Mr. Barton.

Mr. BARTON. Thank you, Mr. Chairman. I would ask unanimous consent that my opening statement be made a part of the record.

Mr. STEARNS. So ordered.

Mr. BARTON. I just have one question, Doctor. The Senate moved the reauthorization bill for your agency on their highway bill. The Bush Administration has objected to some of the mandatory provisions in that particular reauthorization. If we were to decide to move a clean bill through regular order through this committee, would you and your administration at NHTSA work with us to do that?

Mr. RUNGE. Absolutely, Mr. Chairman, we'd be delighted to.

Mr. BARTON. Thank you.

Mr. STEARNS. I thank the gentleman. Mr. Davis?

Mr. DAVIS. Thank you, Mr. Chairman. Dr. Runge, I want to first salute the level of service I'm aware of that your administration observes with respect to your website and to phone calls from my constituents and I'm sure others, information about crash worthiness and safety ratings.

One of the things we would all agree upon is informed judgment by consumers, one of the best forms of protection as far as safety.

Mr. RUNGE. Thank you.

Mr. DAVIS. It's not easy to do that well either. I wanted to ask you a couple of questions, the first pertains to the protections in terms of the side solutions. There's a news article I had that suggests that the auto makers pledge to make voluntary changes, would take effect by September 1, 2009 and if, in fact, that's correct, my question to you was what your observations were about that timeframe in relation to discussions you're having about your own track.

Mr. RUNGE. When we were briefed on the outcome of that voluntary agreement, we were very happy that they have agreed in the first phase, in the earlier compliance test, to meet our 75 degree pole test, which almost certainly will voluntarily mandate, if that's a phrase, head protection through the use of side curtain airbags. This is a tremendous stride and in fact, in our own rule that we'll be proposing shortly, we will have a very similar counter measure in mind. There's no question that that will reduce the cost of compliance with this rule, which is better for all parties.

Their voluntary standard for 2009 involves a different barrier and we need to look very carefully at the differences in countermeasures that might be applied to meet that as well. We are committed to paying attention to, for the first time, in our side impact standard and I think that we will arrive at virtually the same place by 2009.

Mr. DAVIS. So your observation today is the 2009 timeframe sounds like a suitable timeframe for that type of compliance?

Mr. RUNGE. I would imagine that by 2007, if the majority of their fleet meets the 75 degree pole test, that we'll see these countermeasures appear a lot sooner. In fact, at the Auto Show, I was taken around by the people from the different manufacturers and they were eager to show me how their engineering, their roof rails with the possibility of packaging a bag in there that can be put in. In many cases, they're already there, particularly as options. So we're making rapid progress here.

Mr. DAVIS. When we're talking about 2007 and your observations, are we also talking about the protections in terms of side collisions with pick up trucks and SUVs, as well as poles?

Mr. RUNGE. Yes. If in fact, this voluntary agreement takes place and the majority of vehicles meet the standard by 2007, we will have come a long way toward protecting Americans from incompatible vehicles.

Mr. DAVIS. My second question pertains to my State, Florida, and perhaps other States that have repealed laws that previously required people driving motorcycles on public roads to wear a helmet. I am not aware that in my State there was any study done

before that was repealed, nor any study done since in terms of how it has affected the safety and survivorability of people driving motorcycles. I wanted to ask you if you had any general or specific observations about that in any studies you're aware of on that particular issue and how many States are doing this?

Mr. RUNGE. We just released a study looking at two States, Kentucky's and Louisiana's repeal of their helmet laws and looked at the difference in fatalities before and after. In Louisiana, I think there was a 230 percent increase in fatalities following the repeal of that law. I'm not aware of the data from Florida.

Now it's not only helmet use. Other protective equipment is also important, and we also see a phenomenon in States that have no helmet law, where ridership seems to go up, so there's also an exposure issue that is not adequately accounted for in that study. These are very difficult to do because it's very difficult to achieve, to find a rate because we don't know the vehicle miles traveled by motorcycles. But I can tell you that very clearly that Newtonian laws of physics are pretty straightforward here, and when a head meets the pavement, there's no stopping distance and there's a lot of force applied and death occurs.

Mr. DAVIS. Thank you. Thank you, Mr. Chairman.

Mr. STEARNS. I thank the gentleman. We have a series of three or four votes in about 10 minutes. So I just urge members, if possible, we could get through all the questioning of the chairman, so he could go, take our break and then the second panel comes back.

So Mr. Otter is next.

Mr. OTTER. Thank you, Mr. Chairman, and thank you, Doctor, for your testimony earlier. I'm a little confused though. I don't quite understand a couple of the figures relative to the deaths of 202 that you've got in your report. On your first citation it's 42,815 and then a citation later in your testimony is 32,598 for the same year and I'm trying to understand what the difference is between those two.

Mr. RUNGE. Forty-two thousand eight hundred fifteen includes pedestrians, motorcyclists and pedal cyclists; 32,598 are the numbers of vehicle occupants that were killed.

Mr. OTTER. Oh, I see. So then auto safety probably would be closer to the 32,000 rather than the 42,000?

Mr. RUNGE. Well, usually when a pedestrian is killed, an automobile hits him, so there are counter measures that can also be applied for pedestrian safety.

Mr. OTTER. No, I understand that. But usually, there should be some personal responsibility involved here as well, whether you're pedaling a bicycle. You know if you're going to run into a car, anyway that's another discussion we'll get into later.

Let me ask you, has the agency proposed any kind of marketplace discipline in some of these areas where we can't seem to accept by law, enforce personal responsibility whether it's putting on the seat belt or driving the speed limit or whatever. For instance, like allowing the insurance companies to say look, if you get in a car accident we're not going to insure you unless you've got your seat belt on. Is there any kind of marketplace discipline or schemes that you folks have even entertained to say maybe let's let the marketplace do some of this and personal responsibility if it's going to

cost me an accident because I don't have my seat belt on and I'm going to have to pay for it. It's a lot different.

Mr. RUNGE. That's a great question, and we have entertained those countermeasures.

Mr. OTTER. Have you tried them anywhere?

Mr. RUNGE. That might be a more appropriate question to ask Mr. O'Neill with the Insurance Institute. We've talked to the insurance industry about some of these things. One of the problems, and I think the States number in the 20's, if someone runs into you and is not belted and is severely injured or dies, and they sue you, there are States that prohibit bringing up the evidence of whether or not they were belted is contributory to their injuries. So there's a lot of State legislation around here that actually inhibits those market forces from taking place. But there's no question that non-smokers get cheaper life insurance. Clearly, people who are belted should get cheaper automobile insurance it seems to me, but then again, I'm not an actuarial. We would like to explore those sort of things.

Mr. OTTER. Of the 32,000, let's work with that number. Of the 32,000 folks that—do you have that demographic divided up into SUVs and small cars and big cars and pickups?

Mr. RUNGE. I do, but I don't have that with me. But we do.

Mr. OTTER. I would like to get the percentage of larger vehicles, the SUVs and the pickups which are suggested by some to be the safest on the highway and suggested by others to be the killers on the highway.

One other question I would have and that is relative to highway safety. Do you get involved with highway safety at all, does your agency?

Mr. RUNGE. I'm sorry, sir?

Mr. OTTER. Other than the vehicles and design and operation and that sort of thing?

Mr. RUNGE. Yes, we have—we also have authorization and a mandate to take care of human factors as well.

Mr. OTTER. The reason I ask this question is because we've got a stretch of highway in Northern Idaho and Highway 95 we refer to as blood alley. We average 32 deaths a year on that and for the most part the reconstruction of that and redesign of that has been held up because of three toed frog or something, some slick spot peppergrass or something. And I was just wondering, does your agency have any authority to go forward and perhaps say these human lives are awfully important. In fact, I remember when I was on the Transportation Committee and I think you were there when the then Governor of New Jersey, not Christy Todd Whitman, but the one after that, testified that they had an offering that they had tried to get for 10 years, but they had a couple of acres of swamp that they couldn't get mitigation on and my question would just go to is there any input that you have or authority that you have to force some kind of mitigation so that we can stop killing people?

Mr. RUNGE. The road building group is the Federal Highway Administration. Administrator Peters and I, I believe, were on that panel, and let me just say it is a priority of the Secretary and of Administrator Peters to improve environmental streamlining. They've been working on this very diligently and I believe there are

some provisions in the President's safety reauthorization bill that would provide for that.

Mr. OTTER. Thank you.

Mr. STEARNS. Thank the gentleman. Mr. Gonzalez.

Mr. GONZALEZ. Thank you very much, Mr. Chairman. Quickly, I'll try—I'm new to the committee and trying to understand process. On the reauthorization and I guess it's kind of a philosophical debate that's going on and your position is mandates would obviously get in the way of you establishing whatever priorities you deem are necessary than applying limited resources that you have to do in your job, yet I guess Members of Congress always feel that we're a lot closer to the people. We hear from constituents. We have a hand on the pulse and therefore identify certain problems that we feel that your agency should be addressing.

Is there anything short of mandates in order to accomplish that? In other words, how do we communicate with you? I've noticed that you've had your priorities and I know in the State of Texas, and I know that many consider that maybe not even part of the United States, it's a whole different culture, but the views that are expressed are the concerns that I hear really are about vehicle size and the fact that people don't feel comfortable in the city of San Antonio unless they really get into a bigger vehicle. That is recounted time and time again. And I will ask why do you drive the Suburban which is a great vehicle and such and they will always say it's always about safety, always about safety which you can understand if you're driving a Saturn and you're at the stop light and a Hummer comes next to you. You really understand things about size.

So I guess what I'm saying is in my area the concern is really size. Yet, I'm not sure that's addressed or maybe I just missed it in what you had as far as some of your priorities. So one, policywise, how do we get your attention without legislative mandates and second, are you doing anything regarding this particular problem as expressed by the statistics?

Mr. RUNGE. First of all, I'll give you my phone number and my cell phone number and you can call me any time. Our agency has five priorities: safety belt use, reducing impaired driving, improving data and traffic records, reducing rollover and improving compatibility or reducing the problems with incompatibility. That is one of our five agency priorities. We've been pushing on this really, really hard for 3 years and what is going to make the biggest difference the soonest is revising our side impact standard so that when one unfortunately is struck by something larger, that you are not doomed to be killed by an incompatible vehicle striking where the energy absorbing structures aren't on that Saturn.

The second piece of the incompatibility issue is with the striking vehicle and re-engineering the striking vehicle. We have to have some metrics for measuring the load path of the striking vehicle so that the vehicle engineers can engineer the struck vehicle in order to absorb that energy. I hope this is not too technical, but there's the struck vehicle and there's the striking vehicle and we have to tackle both of those things.

The industry picked up the gauntlet that I threw down and they have voluntarily agreed to put these countermeasures in for self-

protection starting by 2007 and 2009 for separate test procedure. This is really good. We are also evaluating our side impact standard. And we're doing research on how best to judge that aggressivity of the striking vehicle. But this is not something that you can just pronounce that it will be done. This really is part of a deliberative, very careful process that will end up with a performance-basesd standard so that when we make a rule as to how something has to be, we say how it has to perform. We don't say how it has to be designed. In order to do that, we have to have tests. We have to design compliance tests that are done exactly the same way every single time.

Congress has our attention, absolutely. We have numerous reports. We're very happy to communicate with the committee in written form or orally. Our priority-setting is a very public process and we look at the data. These are all data-driven prioritizations that we do. So where there are some constituents that you might have who are not getting their problems addressed, it may be unfortunate, but where we are seeing 2, 3, 4 or 5 people killed in the country by something that could be addressed, we simply are not willing to take resources off of something that's killing hundreds and hundreds and hundreds of people to do that. It's a little cold, but that's my whole bureaucratic hat.

Mr. GONZALEZ. It's almost basic, just height requirements. I mean that is a major engineering reconfiguration and I understand the problems with that, but when you're talking about side impact, some of these things are—there is no metal on the side impact to the vehicle that is being hit on the side. It's glass or mostly glass. That's how high the difference is on some of the bumpers and such. But I do look forward to working with you in the future and I would like your cell phone. Anybody that gives you their cell phone number is either a real close friend or is a glutton for punishment.

Thank you very much.

Mr. STEARNS. And I thank the gentleman. Mr. Shimkus.

Mr. SHIMKUS. Thank you, Mr. Chairman, and I can assure my friend Charlie that Dr. Runge is very accessible. He's been in my office a couple of times and I think you'll find him a pleasure to work with in the administration. So Dr. Runge, welcome. You don't have your motorcycle helmet with you today. My motorcycle rider friends always say there's that dang Dr. Runge carrying that motorcycle helmet, but it is an illustration of the points I think in the initial motorcycle debate that my colleague Mr. Davis brought up.

Before I talk, ask a few questions, I also want to make sure I recognize Mr. Jason Bonin who is the Vice President of Lighting and Technology for Hella North America. He's in the next panel, the facility in my District located in Florida. I look forward to visiting that facility. Yes, there is manufacturing in America. It is—there is a difficult challenge and a lot of that is taxation, a lot of that is overregulation, but believe it or not, there are still a few manufacturing facilities and we're trying to keep them in the United States. So it's great to be able to welcome him here.

I guess the first question is things we've talked about in the office. Is it still the intent of NHTSA to ensure that taxpayer dollars at the Federal level are not going to lobby State legislatures to pass State law?

Mr. RUNGE. We do not lobby State legislatures, but we do show up when they ask us to.

Mr. SHIMKUS. That's correct. That was an issue of contention, as you know, with publicized material and I just want to re-emphasize the fact that taxpayers do not expect taxpayers' dollars to go to fund lobbying, quote unquote lobbying activities or issues and we've had that debate before.

I think it's also my impression that in the budgetary debates, there may be a restriction of motorcycle rider safety programs. Are you aware of that? And have you been able to do any analysis of motorcycle rider classes with respect to safety and educational aspects?

Mr. RUNGE. We do support motorcycle rider training. It's part of our national agenda for motorcycle safety. There seems to be a feeling among many of the rider community that the Federal Government should pay for rider education in the State level and we disagree. We believe that it's every driver's——

Mr. SHIMKUS. Has there been a history before that? Is this a shift? What's driving that?

Mr. RUNGE. There's no shift. We've never paid for anyone's personal education in any driving course that I'm aware of.

Mr. SHIMKUS. I'm asking to try to find out. Obviously, there is a concern and the question is maybe not through you, but maybe through some DOT issues or—I'm not sure. To say that the Federal Government is not involved in education and funding would not be an overall accurate statement, but it may be in this case. I would just say that if safety is an issue, driver safety issues might be of concern. That's been raised by us and that's why I ask the question.

Mr. RUNGE. Yes sir. We do support rider education. We've been working with the Motorcycle Safety Foundation, which is a manufacturers group on this. Most of my staff has taken the course, in fact. We do support it, but we believe that everybody has his own responsibility to pay for his own driver education, including whether it's a car and a 16-year-old or if it's a motorcycle rider.

Mr. SHIMKUS. Thank you, Mr. Chairman. Thank you for your time and I yield back.

Mr. STEARNS. I thank the gentleman. The gentleman from New Hampshire, Mr. Bass.

Mr. BASS. Thank you very much, Mr. Chairman. The New Hampshire State Motto is "Live Free or Die." We do not have a seat belt law as my friend from Michigan so aptly pointed out. We're the only State in the Nation that does not. We do not have a motorcycle helmet law and we do not even have mandatory insurance required for automobile usage in New Hampshire. This has been a subject of debate for my entire career in politics going back to my time in the legislature when both the helmet law and the seat belt laws were debated. We've had an interesting association with the transportation bill over the years as the State has received a waiver, both in TEA21 and ISTEA prior to that and obviously these are issues that it's hard for the arguments on a State level to get beyond that feeling that there's something arbitrary about the Federal Government deciding or forcing somebody to do something when they're driving their car.

I happen to be a seat belt user. New Hampshire, by the way, has a mandatory or primary seat belt law for anybody under the age of 15 and they have a mandatory child safety seat law and so forth. And indeed, the figures do show that seat belt usage is lower in New Hampshire than it is anywhere else, I believe, in the nature. Our seat belt usage is about 57 percent and I think the national average is around 79 percent, something like that.

However, there is one interesting piece of data and that is that New Hampshire's fatality rate is significantly lower than the national average. So it is my hope, Dr. Runge, that as we discuss the reauthorization of this important bill, that we try to avoid getting into the issue of mandating a specific quote unquote fixing an issue that we create considerable controversy in my home State.

I am also pleased to hear that you're willing to work, as Chairman Barton mentioned, you're glad to work with us on the reauthorization issue for a stand-alone bill so that the safety criterion deadlines that we may neutrally decide are appropriate are the ones that we can work on together so that we achieve a balance, an important balance between what is practical and economic and what will work the best to ensure the best highway safety.

And I also want to commend NHTSA for its willingness over the years to really use sound science and research and so forth and express pride at the fact that the agency has done that over the years. So your agency has done a great job and we're looking forward to working with you on this reauthorization. I don't really—I didn't get a chance to make an opening statement, so I think would you believe that that is my opening statement and not a question for you?

Mr. RUNGE. Absolutely.

Mr. BASS. I yield back.

Mr. STEARNS. I thank the gentleman and Dr. Runge, I think we've completed our questions with you. We thank you very much for your time and patience and now we'll call up the second panel.

Mr. RUNGE. Thank you, Mr. Chairman.

Mr. STEARNS. Mr. Donald Shea is President and Chief Executive Officer of the Rubber Manufacturers Association; Mr. Robert Strassburger, Vice President, Safety and Harmonization, Alliance of Automobile Manufacturers; Dr. David Pittle, Ph.D., Senior Vice President, Technical Policy, Consumer Union; Mr. Brian O'Neill, President, Insurance Institute for Highway Safety; and last, Mr. Jason Bonin, Vice President for Lighting Technology, Hella North America and we welcome all of you folks to Panel 2 and I think we'll start off with Mr. Shea on my right with your opening statement. Each of you have 5 minutes. We're fortunate we haven't been interrupted with any bells, so I feel with some deal of satisfaction that we can keep the hearing going. I appreciate the members' opening statements and also their questions, and now with your opening statements and then we'll move to questions.

Mr. Shea, you'll start. Just move the microphone close enough to you and just turn it on so we can hear it. Thank you.

STATEMENTS OF DONALD B. SHEA, PRESIDENT AND CHIEF EXECUTIVE OFFICER, RUBBER MANUFACTURERS ASSOCIATION; ROBERT STRASSBURGER, VICE PRESIDENT, SAFETY AND HARMONIZATION, ALLIANCE OF AUTOMOBILE MANUFACTURERS; R. DAVID PITTLE, SENIOR VICE PRESIDENT, TECHNICAL POLICY, CONSUMERS UNION; BRIAN O'NEILL, PRESIDENT, INSURANCE INSTITUTE FOR HIGH SAFETY; AND JASON BONIN, VICE PRESIDENT FOR LIGHTING TECHNOLOGY, HELLA NORTH AMERICA

Mr. SHEA. Good morning, Mr. Chairman and distinguished members of the committee. My name is Donald Shea and I am President of the Rubber Manufacturers Association which represents tire manufacturers and manufacturers of other products. I have submitted written testimony to the committee and request that my oral statement be included in the record.

Mr. STEARNS. So ordered.

Mr. SHEA. Mr. Chairman, as you and this committee know, implementation of the TREAD Act is well underway. This historic and far-reaching legislation has had profound impact on the tire industry. RMA and its members supported enactment of the TREAD Act and have provided extensive input to NHTSA throughout the rulemaking process.

I should note that NHTSA has expended enormous efforts in promulgating rules called for under the TREAD Act and accomplishing it, as Dr. Runge noted, in record time.

As we near the end of this process, the tire industry wishes to bring to your attention issues that will ensure that the spirit and the letter of the law will be fully implemented. A complete enforcement, compliance and auditing program is necessary to ensure that the TREAD Act works as intended. RMA members have invested significant resources to comply with the new rules. Those who comply will be at a start competitive disadvantage if other companies escape these requirements. The early warning reporting system is a first of its kind program designed to help regulators and industry spot potential performance issues. Each year, tire manufacturers will report over 1 million pieces of data to NHTSA about our products. Any company failing to comply with this rule not only escapes the financial cost of compliance, but puts lies at risk by denying Federal safety regulators information that may signal and emerging safety problem.

Tire testing standards also will require a compliance program. RMA members alone will spend over $1.7 billion to comply with this rule. Tire manufacturers who avoid compliance would have a significant cost advantage over companies that adhere to the rule. More importantly, new tires that do not conform to the revised testing standards will not give consumers the benefit of more robust performance these new standards demand.

RMA urges Congress to set aside adequate funding for compliance and auditing work on early warning reporting and tire testing and we would welcome the opportunity to work with NHTSA to establish an appropriate, cost effective program of enforcement that can be reported on Congress.

In addition to the compliance matter, the tire industry is faced with other issues. The Senate's NHTSA reauthorization measure

contains three provisions relating to tires. We commend the Senate for its desire to enhance motoring safety. While we recognize the Senate's intent to refine and improve tire safety, RMA does not support the tire provisions in the Senate bill. One provision calls for an accelerated aging test requirement. RMA and the automotive industry are already working to design a science-based accelerated aging test for tires. NHTSA should be allowed to consider this work and thereafter develop the appropriate test method as well as time line, thereby precluding the need for the Senate mandate.

The other Senate provisions for new strength in bead and seating tests will not assist the agency or the public in assessing radial tire performance. NHTSA postponed consideration of these tests because their analysis found that such tests were not appropriate requirements and we share the agency's view.

Another issue that has recently emerged is tire expiration dates. The U.S. tire industry is currently engaged in dialog with our counterparts in Europe and Asia on this subject and our objective is to develop a consensus global tire industry recommendation regarding tire service life within the next several months.

We're also concerned that some TREAD Act issues have not been fully resolved. RMA has filed timely petitions for reconsideration for several TREAD Act rules. To date, our petitions for tire labeling and tire testing have not been answered, and we hope that NHTSA will respond soon to these petitions and accept our recommendations.

Finally, in July 2002, RMA petitioned NHTSA to establish a tire pressure reserve based on the minimum pressure required to carry the vehicle maximum load. RMA's petition would mandate that tires have a sufficient reserve inflation pressure so that a tire pressure monitoring system will warn motorists before tires are operated in an unsafe condition.

RMA urges NHTSA to grant this petition so that all interested parties can formally register their views with the agency.

Again, I wish to thank you, Mr. Chairman, and the members of the committee for the opportunity to provide these comments and I'll be pleased to answer your questions.

[The prepared statement of Donald B. Shea follows:]

PREPARED STATEMENT OF DONALD B. SHEA, PRESIDENT AND CHIEF EXECUTIVE OFFICER, THE RUBBER MANUFACTURERS ASSOCIATION

The Rubber Manufacturers Association (RMA) is the national trade association for the tire and rubber products manufacturing industry. RMA represents more than 120 companies that manufacture various rubber products. These member companies include every major domestic tire manufacturer including Bridgestone Americas Holding, Inc., Continental Tire N.A. Inc., Cooper Tire & Rubber Company, The Goodyear Tire and Rubber Company, Michelin North America, Inc., Pirelli Tire North America Inc., and Yokohama Tire Corporation. RMA is pleased to submit these comments on reauthorization of the National Highway Traffic Safety Administration (NHTSA).

The tire industry is an integral part of the nation's economy and transportation system. In 2003 RMA members manufactured over 230 million tires in the United States. In this country, RMA tire manufacturing members operate 36 manufacturing facilities and employ almost 50,000 workers.

Over 98 percent of all tires on passenger cars in the U.S. are radial tires. A radial tire is a highly engineered structure consisting of six major components, each with separate functions. These components include: the inner liner, the beads, the body plies, the steel belts, the tread, and the rubber sidewalls.

Tire design and production involves sophisticated engineering in product design, testing, manufacturing, and analysis. Designing and building today's complex tires is no simple task. Producing a tire involves a combination of chemistry, physics, and engineering plus more than 200 raw materials including natural and synthetic rubbers, metals, fabrics, oils, pigments, and other chemicals.

Tire and cars are an integrated system. Tires are particularized and are tested for performance to the specifications of the original equipment manufacturer on a certain class of vehicle and type of service. For tires to perform properly, a delicate balance must be maintained with all characteristics such as wet and dry traction, handling, smooth ride, and noise.

RMA's tire manufacturer members invest time, effort and resources to produce safe tires. Nearly 1 billion tires are on U.S. passenger vehicles today and by any measurement, tire performance is superior despite, in many circumstances, operating under-inflated and overloaded in high-speed conditions and in a variety of road and environmental conditions.

RMA has long sought to help consumers understand the importance of tire maintenance. RMA's tire care and safety education efforts were reinvigorated in 2000 with the launching of the *Be Tire Smart—Play Your PART* program to help drivers learn the simple steps they can take to ensure that their tires are in good working condition. The term "PART" is an acronym that stands for Pressure, Alignment, Rotation and Tread—the four key elements of tire care. RMA's website, www.betiresmart.org, offers valuable tire safety information for consumers and includes a downloadable brochure in both English and Spanish. In the past three years, RMA has distributed over 6 million printed copies of the industry's *Be Tire Smart* brochure. This year, RMA's brochures will be available in over 6,000 tire retail outlets.

In 2002, RMA launched National Tire Safety Week to give the tire industry an opportunity to focus on tire safety education. This year, National Tire Safety Week will take place April 25-May 1. Since the launch of the program, RMA has held Tire Safety Days in over 20 cities in which RMA coordinated with industry partners like AAA and local tire dealers to help educate motorists about tire safety.

RMA's *Be Tire Smart* program both compliments and reinforces other tire care and maintenance efforts by RMA member companies and NHTSA's *Tire Safety: Everything Rides On It* program. RMA also is encouraging its members to promote seatbelt use by employing such messaging in the *Be Tire Smart* brochures and supporting passage of primary seatbelt enforcement legislation.

RMA and its members have worked extensively with NHTSA on issues of tire safety, tire performance reporting, and consumer information. While work on most of the issues mandated by the TREAD Act has been completed, RMA believes that there are significant challenges facing the agency and the industry. However, NHTSA's program of work should be guided by three principles:

- Motorist safety;
- Sound science and data; and
- Cost effectiveness.

IMPLEMENTATION OF THE TREAD ACT

RMA worked with this committee and supported passage of the Transportation, Recall, Enhancement, Accountability and Documentation (TREAD) Act that was signed into law on November 1, 2000. The TREAD Act required twelve separate rulemakings. To date all of the rulemakings impacting tires have been completed except tire pressure monitoring and new testing requirements for commercial truck tires. New programs have been instituted and performance requirements for tires have been increased.

Tire Labeling for Light Vehicle Tires—FMVSS 139

The final rule for labeling of light vehicle tires was announced November 18, 2002. This rule has a phased-in compliance schedule requiring forty percent of the tires manufactured on or after September 1, 2004 and before September 2005 to comply with the rule. Seventy percent of the tires manufactured on or after September 1, 2005 and before September 1, 2006 must comply and all tires manufactured after September 2006 must comply.

NHTSA's final rule requires the full tire identification number (TIN) to be on the intended outboard sidewall, if there is one, with a partial TIN on the opposite sidewall. RMA supports the new requirement to add a partial TIN to the opposite side from the full TIN. However, the new mandate to place the full TIN on the intended outboard side will not only force huge compliance costs on the industry, but will also

expose tire industry employees to workplace safety hazards and significant risks of injury.

The final rule would require workers to change the date code of the TIN on a weekly basis in a hot (300°+) mold in mass production. Since the intended outboard sidewall is usually in the top half of the tire mold this change requires workers to climb or lean into the mold. The only way to comply with the rule and still eliminate the worker safety issue is either (a) to flip the molds over in the press or (b) to replace an existing mold with a new mold with the intended outboard sidewall in the bottom of the mold rather than the top. RMA member companies work with approximately 100,000 molds. The complexity of flipping a mold over in the press varies according to the type of mold and its configuration. It is not as simple as removing the mold from the press and reinstalling it upside down. In many, if not most cases, flipping the mold over is not possible, and consequently the mold would have to be replaced. RMA estimates that the compliance costs for these alternatives exceeds $220 million.

RMA filed a timely petition for reconsideration on tire labeling on January 2, 2003. The agency has not responded to that petition. In that petition for reconsideration, RMA recommended that the full TIN be placed on one side of the tire with the partial TIN on the other tire sidewall. Using NHTSA's own estimates the RMA recommendation would allow a consumer to identify the family of tires that might be subject to a recall 87% of the time. The RMA recommendation has the added value of minimizing the adverse economic impact and eliminating the worker safety concerns.

Tire Testing for Light Vehicle Tires—FMVSS 139

Existing tire testing regulations (FMVSS 109) were promulgated in 1968. At that time nearly all of the passenger car tires in the world were of bias or bias-ply construction. Tires have vastly improved since the 1968 regulations were promulgated. In January 1999 RMA petitioned NHTSA to update those standards. With the passage of the TREAD Act, NHTSA was required to promulgate new tire testing standards (FMVSS 139).

The final rule for light vehicle tire testing was announced on June 26, 2003 with a compliance date for all tires by June 1, 2007. The new test standard applies to new radial tires used on powered motor vehicles with gross vehicle weight rating of 10,000 pounds or less. NHTSA did exempt certain specialty tires from the new requirements including trailer tires, farm tires, temporary spares, and all bias light tires for highway use. Snow tires are required to meet the new standards.

The regulatory requirements include:

- Low pressure performance test—new
  - Tires run at approximately 40 percent below maximum inflation pressure.
- High speed test—upgraded
  - Maximum test speed raised from 85 mph to 99 mph
  - Light truck tires are now required to be tested for high speed and must meet the same minimum speed
- Endurance test—upgraded
  - Speed raised from 50 mph to 75 mph
  - Test time increased from 34 hours to 40 hours

RMA supported these revised testing standards, which are now the most stringent in the world.

Two significant test method issues remain in the testing of light vehicle tires: testing tire pressure and chunking.

Testing Tire Pressure

In a petition for reconsideration filed with the agency RMA recommended that tire pressure should be measured at least 15 minutes after completion of the tests. RMA also recommended allowing a five percent pressure reduction at test completion. This is needed because when a tire's pressure is checked, the following occurs:

- Some small amount of air is required to activate the tire gauge;
- Some small amount of air may escape in the process of checking;
- Some differential because of inelastic growth due to heat during testing;
- Some differential because of diffusion; and
- Some variation caused by level of gauge repeatability.

RMA urges NHTSA to accept this recommendation.

Chunking

As promulgated, the final rule for FMVSS 139 will cause abnormal parasitic tread chunking for a significant number of existing light vehicle tires, particularly some deep tread, winter type snow tires and light truck (LT) tires. Tread chunking is the

result of the cumulative affect of laboratory road-wheel curvature and test conditions, and is not indicative of real-world performance for these tire types. Tires on the road do not fail because of this type of tread chunking. Because of laboratory induced chunking some of the best performing snow tires and LT tires will have to be redesigned solely to pass the new endurance and low-pressure tests and may not perform as well for their primary function. Contrary to the intent of Congress and the TREAD Act, these design changes will not improve but rather will reduce snow traction as well as on- and off-road traction performance. RMA has recommended a series of alternatives to the agency to exempt chunking as a failure mode for the new testing regime. RMA urges the agency to accept one of these alternatives.

Early Warning Reporting

The final rule for light vehicle tires, motor vehicles, child seats, and motor vehicles parts was announced on July 10, 2002. The rule requires the tire industry to report claims of injuries and fatalities, lawsuits, warranty adjustments, property damage claims, and consumer advisories and campaigns to NHTSA on a quarterly basis for all tires with an annual U.S. production exceeding 15,000. The first quarterly report was filed on December 1, 2003 for the third quarter of 2003 with a one-time historical report filed on January 15, 2004. The quarterly report for the fourth quarter of 2003 was filed on March 1, 2004. This data must be recognized as early warning data and not substantiated root cause analysis. The reliability of this data is limited to early warning.

Tire Pressure Reserve

NHTSA stated in the notice accompanying the final tire pressure monitoring rule, "(m)any vehicles have significantly under-inflated tires, primarily because drivers infrequently check their vehicle's tire pressure." 67 Fed Reg. at 38713-38714. The agency also recognized that "a significant majority of drivers would be less concerned, to either a great extent or very great extent, with routinely maintaining the pressure of their tires if their vehicle were equipped with a TPMS." 67 Fed. Reg. at 38706.

The decision of the U.S. Court of Appeals for the 2nd Circuit in *Public Citizen v. Norman Mineta* vacated and remanded the rule for further consideration. RMA has asserted repeatedly that tires will take an indeterminate, but not indefinite, amount of abuse. The agency has failed to be guided by this basic tire engineering principle. Under-inflation of tires and overloading of vehicles will have an effect on tire performance and may cause a tire to fail. If tire pressure monitoring systems cannot be designed to alert the driver when a vehicle is overloaded, NHTSA must ensure that tires are not under-inflated.

RMA petitioned NHTSA on July 22, 2002 to establish a pressure reserve based on the minimum pressure required to carry the vehicle maximum load and the activation pressure of the selected TPMS. A survey sponsored by RMA and presented to NHTSA found that the frequency of U.S. motorists checking tire pressure will likely drop by nearly 25 percent in vehicles equipped with tire pressure monitoring systems. Even motorists who exhibit the most responsible tire pressure checking behavior—checking tire pressure at least once a month—would likely show a significant decline in tire maintenance.

The RMA proposed solution to assure all in-service light vehicle tires, including spares, have sufficient pressure under all reasonable operating conditions, including at or near maximum load, is for NHTSA to require TPMS telltale activation before the tire load/pressure limits are exceeded. This can be accomplished in the following three ways, used either separately or in combination depending on individual vehicle circumstances: 1) raise the placard recommended tire inflation pressure, 2) increase the tire size, or 3) fit the vehicle with a more accurate TPMS device.

The agency has not responded to this petition. RMA urges NHTSA to grant this petition forthwith so that all interested parties can register their views with the agency.

ENFORCEMENT, COMPLIANCE, AND AUDITING

In the TREAD Act, Congress required NHTSA and the industry to work harder and faster to promote motor vehicle safety. These efforts will not be completely effective unless compliance can be insured. A complete enforcement, compliance, and auditing program are necessary in order to ensure that the TREAD Act will work. The 2003 *Tire Guide* indicates over 80 manufacturers of passenger car tires alone. Many of these are private brand labels of major manufacturers of tires already in compliance with NHTSA regulations. However, without a vigorous enforcement, compliance, and auditing program, NHTSA will not be able to ensure that all of the manufacturers comply with the federal law.

RMA urges Congress to set aside sufficient funding for compliance and auditing work on early warning reporting and tire testing. The agency has begun compliance work on early warning reporting by sending out 8,000 letters to manufacturers that did not file early warning reports for the third quarter of 2003. However, NHTSA needs sufficient resources to follow up with non-filers. As more and more tires are manufactured overseas by manufacturers without a significant U.S. presence, and imported into the United States, this may require coordination with Customs and other governmental agencies. These efforts will ensure a level marketplace and compliance with the TREAD requirements.

The highway tire test standards in the United States allow the tire manufacturer to certify compliance with the regulation by stamping DOT on the tire. This system works well. However, this system depends on a vigilant audit and testing system. Funding must be established for this effort. RMA would welcome the opportunity to work with this Committee and NHTSA to establish an appropriate and cost-effective program of enforcement and auditing.

NEW INITIATIVES

During consideration of NHTSA reauthorization, the Senate included a number of mandated rulemakings pertaining to tire testing. Included are mandates for new safety performance criteria for strength and road hazard protection, bead unseating, and aging. In addition, the legislation would require the agency to reconsider the use of shearography analysis for regulatory compliance. RMA does not support the tire related provisions in the Senate bill.

Tire manufacturers, automobile manufacturers, and NHTSA are currently working on tire age endurance testing method. A regulation will follow and a Congressional mandate is not necessary.

Current light vehicle tire testing requirements contain strength and bead unseating tests. These requirements were designed for bias ply tires and do not provide any assistance in analyzing a radial tire's durability. Although NHTSA attempted to establish new testing regimes for strength and bead unseating in the new testing requirements, these proposed tests were not repeatable or cost effective, thereby making them inappropriate test requirements. In the final rule NHTSA decided to postpone implementation of these proposals. The high speed, endurance, and low pressure tests required under FMVSS 139 provide sufficient and appropriate test requirements for today's radial tires. New strength or bead unseating tests will not assist the agency or the public in assessing radial tire performance.

Accelerated Tire Age Endurance

Congress explicitly stated the need for some type of aging test on light vehicle tires in the TREAD Act. RMA supports this requirement but does not believe a new Congressional mandate is necessary. An accelerated tire age test does not currently exist and there is no industry-wide recommended practice for accelerating the aging of tires. Under the Final Rule for Federal Motor Vehicle Safety Standard Part 139 ("FMVSS 139"), the National Highway Traffic Safety Administration ("NHTSA") decided to defer the development of an aging test for approximately two years. *Fed. Reg., Vol. 68 No. 123, at p. 38139.* In developing the test, the agency will consider recommendations pursuant to refining the static and dynamic components of the test. Concurrently, NHTSA will assess the performance of test tires and tires in the field to assure that the test and field data correlate.

The American Society for Testing and Materials ('ASTM") International Committee F09 on Tires has spent the past year developing an accelerated aging design of experiment ("DOE"). The task group is made up of various representatives from tire and automotive manufacturers and test laboratories. Also, NHTSA staff has attended task group meetings as observers. The ultimate objective of the ASTM task group is to develop a scientifically valid, short duration tire aging endurance test standard, which correlates to field behavior, for light vehicle tires. The test standard development is broken into two projects: 1) laboratory accelerated aging DOE and 2) validation of the DOE. Data from real-world aged tires will be used to establish correlation with laboratory aging characteristics. Care will be taken to avoid laboratory-induced failure characteristics, such as road-wheel induced tread chunking, which does not occur in real-world driving conditions.

Ultimately this activity, which will include static and dynamic test components, will result in an industry-wide recommended test standard for evaluating tire age and can serve as a common means of evaluation by tire manufacturers, vehicle manufacturers and testing organizations. The ASTM F09 Committee also plans to formally submit the resulting test standard and pertinent data to NHTSA for consideration in defining an aged tire standard upgrade to FMVSS 139. NHTSA has indicated publicly that they are pleased with the cooperative effort between government

and industry on developing this test method. The tire industry fully supports the efforts of the ASTM task group on aging. RMA has pledged considerable funding so that the first phase of the DOE project can commence very shortly. It is anticipated that the work of ASTM will be completed by August of 2005.

Tire Service Life for Light Vehicle Tires

Tires are composed of various types of material and rubber compounds, which have performance properties essential to the proper functionality of a tire as it relates to its specified application. The serviceability of a tire over time is a function of the storage and service conditions (load, speed, inflation pressure, road hazard injury, environmental exposure, etc.) to which a tire is subjected throughout its lifetime. Furthermore, there are several characteristics that, if present, are cause for service removal such as 2⁄32 of an inch or less tread depth, non-repairable road hazard injuries, signs of damage (cuts, cracks, bulges), or signs of abuse (underinflation, overloading, etc.) Since service conditions vary widely, accurately predicting the serviceable life of a tire in advance is not possible simply based on its calendar age. The same reasoning applies to predict the service life of an automobile that is subject to varying service conditions.

The tire industry has long supported the consumers' role in the regular care and maintenance of their tires. The monthly maintenance inspection for proper inflation pressure and tread wear is supplemented by recurring rotation, balancing and alignment services. Periodically, the condition of a tire should be assessed to determine if there are any tactile, or visual signs that replacement is necessary.

The industry is currently engaged in dialogue with our counterparts in Europe and Asia on the subject of tire service life for light vehicle tires. Our hope is to achieve a global tire industry advisory regarding tire service life within the next few months.

Rolling Resistance

The term "rolling resistance" refers to the force generated by tires that hinders the forward movement of a vehicle. The rolling resistance of a tire is influenced by many factors including tire inflation pressure, load and speed of the vehicle, tire condition, road conditions, and tire design. Lower rolling resistance is associated with higher fuel savings although any fuel saving is dependent on many factors.

According to the federal government, only about 15 percent of the energy in the fuel that goes into a car's gas tank is used to move a car down the road or for other components, like power steering. The largest cost to fuel energy, 62 percent, is lost to engine friction, and other related engine losses. Just idling at stop lights or in heavy traffic, loses 17 percent. In contrast, just over four percent is lost to rolling resistance.

Not unlike many consumer products, tires cannot be all things to all people. Design trends illustrate that when a tire is produced to maximize lower rolling resistance, the performance of wet and dry traction increases. When a tire is designed to maximize traction, optimal rolling resistance goes down. Tread wear is reduced when rolling resistance is reduced. Simply put, there is a fundamental relationship between rolling resistance, traction, and tread wear. One characteristic cannot be maximized without affecting the others.

Great strides have been made in rolling resistance. However, there is no one test to measure rolling resistance performance. Therefore, there is a lack of collective data regarding rolling resistance on replacement tires and its impact on vehicle fuel efficiency. This does not suggest that low rolling resistance does not exist in the replacement tire market, it only implies that the exact measurements and calibration of the replacement tire market is not industry specific and varies from company to company. The data variations in the replacement tire market simply reveal that no standard, industry-wide information exists.

As the National Academy of Sciences recognized in the 2003 report *Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards,* "Continued advances in tire and wheel technologies are directed toward reducing rolling resistance without compromising handling, comfort, or braking. Improvements of about 1 to 1.5 percent are considered possible. The impacts on performance, comfort, durability, and safety must be evaluated, however." *NAS at p. 39.*

Congress required the Secretary of Transportation through the National Academy of Sciences to develop and perform a national tire fuel efficiency study and literature review to consider the relationship that low rolling resistance replacement tires designed for use on passenger cars and light trucks have on fuel consumption and tire wear. However, Congress did not provide additional funding for this effort. RMA urges Congress to add $500,000 to the Transportation, Treasury and Independent Agencies FY 2005 appropriations for this study.

CONCLUSION

NHTSA has met many of the challenges it faced with the passage of the TREAD Act. Now is the time for Congress to provide clear guidance to the agency and the industry for completion of the tasks and for the next steps. With this guidance the agency will need sufficient resources to complete their tasks. RMA looks forward to working with this committee and NHTSA on these issues to promote safety.

Mr. STEARNS. Thank you.

Mr. Strassberger.

STATEMENT OF ROBERT STRASSBERGER

Mr. STRASSBERGER. Thank you, Mr. Chairman. Today we can be proud that consumers are benefiting from the greatest array of vehicle safety features in history in stark contrast to 40 years ago when the Safety Act was first passed. Consumers care more about safety and there now exists a tremendous market demand for ever safer vehicles.

We've already heard this morning my favorite J.D. Powers statistic, that 9 out of 10 vehicles or 9 out of 10 features most desired by consumers in their next new vehicle are designed to enhance safety. But it's not just a statistic. Manufacturers are responding to this increased demand across their entire product lines. For example, among 2004 models, 99 percent are available with antilock breaks; 74 percent are equipped with safety belt pretensioners; 57 percent are equipped with rear center lap shoulder belts; 52 percent are available with side airbags with head protection; and 46 percent are available with electronic stability control. These safety devices and others will continue to spread through the new vehicle fleet and none of these features are required by regulation.

Auto makers are also looking to the future. Last year, the NHTSA Administrator challenged us to address the crash compatibility issue quickly and we did. Alliance members have already begun to implement a multi-phase plan for enhancing the crash compatibility of passenger cars and light trucks. This plan developed by an international group of safety experts will lead to significant improvements in vehicle occupant protection. It will be fully implemented by 2009.

But despite these efforts, in 2002, 59 percent of vehicle occupants killed were not restrained by safety belts or a child safety seat. The single most effective way to reduce traffic fatalities and serious injuries immediately is to increase the use of safety belts and child safety seats. Primary enforcement of safety belt laws results in more people buckling up. States with primary laws have average usage rates approximately 11 percentage points higher than States having secondary enforcement laws.

Currently, only 20 States and the District of Columbia have primary laws. The Administration has requested significant funding for incentives to encourage States to pass primary laws. Congress should approve this proposal.

Impaired driving is also a significant safety problem accounting for 41 percent of all fatalities in 2002 and one that is getting worse. While there was progress in the last two decades, impaired driving is once again on the rise. Repeat offenders are disproportionately involved in fatal crashes. Congress should provide funding beyond

the level proposed by the Administration to enable States to address this deadly problem.

The Alliance believes that if we are to continue to make progress in reducing traffic fatalities and injuries, it is critical that future public policy decisions be data driven, supported by scientifically sound evidence and demonstrate the potential for effective safety benefits without adverse consequences.

NHTSA's two key crash data base programs, NASS and FARS, provide crucial information to safety planners and vehicle design engineers. The NASS program, in particular, has been chronically under funded. Additional funds for NASS should be provided.

In addition to adequate funding for NASS and FARS, the Alliance believes it is important for NHTSA to have the resources necessary to conduct a comprehensive study of crash causation, similar to the multi-year Indiana Tri-Level Study that was completed 25 years ago. Funding for this program should continue.

Now let me turn to the Senate passed bill for just a moment. The NHTSA reauthorization provisions in this bill would mandate more than 10 new major rulemakings that must be issued over the next 2 to 4 years. Each rulemaking must comply with a rigid, predetermined schedule for the NPRM and must end in a final rule. The Alliance strongly opposes the overly prescriptive mandated rulemakings. They will override the safety priorities recently established by NHTSA through an open public process. They will delay or interfere with on-going safety initiatives being pursued by auto makers. They prejudge the outcome of the rulemaking process and finally, they set unrealistic deadlines both in terms of the Safety Act's requirements for objective, practicable standards that meet the need for motor vehicle safety and in terms of an auto makers ability to have adequate lead time to redesign vehicles to meet the new requirements.

We don't oppose open, transparent rulemakings. We do oppose rulemakings where the opportunity for public comment is rendered meaningless by pre-ordained conclusions.

Mr. Chairman, that completes my statement.

[The prepared statement of Robert Strassburger follows:]

PREPARED STATEMENT OF ROBERT STRASSBURGER, VICE PRESIDENT OF SAFETY, ALLIANCE OF AUTOMOBILE MANUFACTURERS

Thank you Mr. Chairman. My name is Robert Strassburger and I am Vice President of Safety at the Alliance of Automobile Manufacturers. I am pleased to be afforded the opportunity to offer the views of the Alliance at this important hearing. The Alliance of Automobile Manufacturers (Alliance) is a trade association of nine car and light truck manufacturers including BMW Group, DaimlerChrysler, Ford Motor Company, General Motors, Mazda, Mitsubishi Motors, Porsche, Toyota and Volkswagen. One out of every 10 jobs in the U.S. is dependent on the automotive industry.

SIGNIFICANT PROGRESS HAS BEEN MADE TO REDUCE FATALITIES AND INJURIES FROM MOTOR VEHICLE CRASHES, BUT CHALLENGES REMAIN

Over the past 20 years, significant progress has been made in reducing the traffic fatality rate. In 1981, the number of fatalities per 100 million vehicle miles traveled stood at 3.17. By 2002, this rate had been driven down by 52 percent to 1.51 fatalities per 100 million vehicle miles traveled. The level of competitiveness among automakers, which key industry observers have described as "brutal," has helped to accelerate the introduction of safety features ahead of regulation further aiding in the progress made.

Product safety is now an area in which manufacturers compete and seek competitive advantage. Safety "sells" and manufacturers are leveraging their safety performance and contenting in efforts to distinguish their products from competitors. According to the J. D. Power and Associates 2002 U.S. Automotive Emerging Technologies study, nine of the top 10 features most desired by consumers in their next new vehicle are designed to enhance vehicle or occupant safety and manufacturers are responding to this increased consumer demand for safety across their entire product line.

Despite the progress made, however, data show that 42,815 people lost their lives on U.S. highways in 2002 and almost 3 million were injured. Tragically, 59 percent of vehicle occupants killed in crashes were not restrained by safety belts or child safety seats. Alcohol-related fatalities increased for the third consecutive year and were a factor in 42 percent of all fatalities. This is unacceptable. As a nation, we simply must do better.

The Alliance and our members are constantly striving to enhance motor vehicle safety. And, we continue to make progress. Each new model year brings safety improvements in vehicles of all sizes and types. But, as the General Accounting Office reaffirmed, vehicle factors contribute less often to crashes and their subsequent injuries than do human or roadway environmental factors [1]. We will never fully realize the potential benefits of vehicle safety technologies until we get vehicle occupants properly restrained and impaired drivers off the road.

INCREASED SAFETY BELT USAGE AND PREVENTING IMPAIRED DRIVING ARE NEEDED TODAY TO PREVENT NEEDLESS FATALITIES AND INJURIES

The single most effective way to reduce traffic fatalities and serious injuries in the short term is to increase the use of occupant restraint systems, safety belts and child safety seats. If the United States could increase its safety belt usage rate from the current 79 percent to 92 percent (the same usage rate as in Canada) it is estimated that another 3,250 lives would be saved and countless injuries would be avoided. Members of the Alliance have a long and proud record in supporting increased safety belt usage beginning in the mid 1980's with funding for Traffic Safety Now, a safety belt advocacy group lobbying state governments for the passage of mandatory safety belt use laws, to participation in and funding of the Air Bag & Seat Belt Safety Campaign (Campaign). The Campaign is housed in the National Safety Council and principally funded by the voluntary contributions of motor vehicle manufacturers. The effectiveness of the Campaign is reflected in the increase in belt use from 61 percent, when the Campaign was formed in 1996, to today, with belt use now at 79 percent.

This 18-percentage point increase in belt use is largely due to high visibility enforcement Mobilizations coordinated by the Campaign in cooperation with The National Highway Traffic Safety Administration (NHTSA), state highway safety offices and law enforcement agencies in all fifty states. Recently, the largest Mobilization ever was conducted with more than 12,500 law enforcement agencies providing stepped up enforcement and close to $25 million in paid advertising to augment the enforcement effort. Funding for the enforcement ads, both national and state, comes from funds earmarked by Congress for this purpose. High visibility enforcement of safety belt laws has been extensively tested in more than twenty states. It has consistently achieved dramatic increases in safety belt use. The Administration has requested $20 million for the paid advertising that has proven to be a vital component of this effective program; we believe that it is important for Congress to continue to provide this funding.

Primary enforcement safety belt use laws are significantly correlated with higher safety belt usage levels. States with primary enforcement laws have average safety belt usage rates approximately 11 percentage points higher than states having secondary enforcement laws. Currently, only 20 states and the District of Columbia have primary safety belt laws. While the Campaign, through its lobbying efforts, has contributed to getting primary enforcement legislation enacted in several states, progress has been difficult to achieve. The Administration has requested significant funding for incentives to states passing primary enforcement laws. This proposal has merit and should be approved by Congress.

Impaired driving is also a significant highway safety problem and one that is getting worse. While substantial progress in reducing impaired driving was made in the last two decades, impaired driving is once again on the rise. Repeat offenders are disproportionately involved in fatal crashes. Congress should provide funding

[1] "Highway Safety—Research Continues on a Variety of Factors That Contribute to Motor Vehicle Crashes." United States General Accounting Office, GAO-03-436, March 2003.

beyond the level proposed by the Administration to enable states to address this deadly problem.

In addition to the priority areas of increasing safety belt use and reducing impaired driving, Congress needs to provide adequate funding for the Section 402 State and Community Highway Safety Program.

ALLIANCE MEMBERS ARE AGGRESSIVELY PURSUING SAFETY ADVANCEMENTS, COLLECTIVELY AND INDIVIDUALLY

Advancing motor vehicle safety remains a significant public health challenge—one that automakers are addressing daily, both individually and collectively. Alliance members make huge investments in safer vehicle design and technology. Manufacturers not only meet, but exceed motor vehicle safety standards in every global market in which vehicles are sold. Many safety features currently available on motor vehicles in the U.S. were implemented ahead of regulation. A partial list of voluntarily installed advanced safety devices without or prior to regulation is attached. See Attachment 1.

The Alliance is pursuing a number of initiatives to enhance safety. We have redoubled and unified our activities to collectively address light truck-to-car collision compatibility and vehicle rollover. On February 11-12, 2003, the Alliance and the Insurance Institute for Highway Safety (IIHS) sponsored an international meeting on enhancing vehicle-to-vehicle crash compatibility. On February 13, 2003, the Alliance and IIHS sent NHTSA Administrator Runge a letter summarizing the results of this meeting, and indicating the industry planned to develop recommendations that auto companies could take to enhance crash compatibility.

Ten months later, on December 2, 2003, we delivered to NHTSA a multi-phase plan for enhancing the crash compatibility of passenger cars and light trucks. This plan was developed by an international group of safety experts. At the same time, we also delivered to NHTSA a commitment made on behalf of the world's automakers to begin to design cars and trucks according to the performance criteria specified in the group of experts' plan. This commitment will lead to significant improvements in the protection afforded to occupants in crashes. It is the most comprehensive voluntary safety initiative ever undertaken by automakers.

For the North American market, front-to-side crashes where the striking vehicle is a light truck or SUV, represent a significant compatibility challenge. We are placing a high priority on enhancing the protection of occupants inside vehicles struck in the side by, among other things enhancing head protection of occupants in struck vehicles. We expect our efforts to lead to measures that auto manufacturers can incorporate in their vehicles. We are working on efforts intended to aid the development of evaluation criteria that will be established to drive improvements in car side structures to reduce side impact intrusion and provide for additional absorption of crash energy.

With regard to front-to-front crashes, our initial plan focuses on specific recommendations to enhance alignment of front-end energy absorbing structures of vehicles. Manufacturers have been working to improve this architectural feature by modifying truck frames. The voluntary standard will govern structural alignment for the entire light-duty vehicle fleet and provide for an industry wide solution. In addition, through research to be undertaken, we expect to develop sophisticated test procedures for assessing the forces, and the distribution of these forces, which light trucks, may impose on cars in frontal crashes. These procedures should lead to more comprehensive approaches to measuring and controlling these forces. We also expect to develop state-of-the-art test procedures for measuring and controlling the frontal stiffness characteristics of passenger cars and light trucks.

These efforts to develop voluntary standards for crash compatibility and rollover, when combined with an industry commitment to design vehicles in accordance with them, is a model for voluntary industry action. These programs are proven to be a very effective way to bring significant safety improvements into the fleet faster than has been historically possible through regulation. The voluntary standards process also has the flexibility to produce rapid modifications should the need arise.

The best way to illustrate the benefits for such an approach is to examine the recent development of the Recommended Procedures for Evaluating Occupant Injury Risk From Deploying Side Airbags finalized in August 2000. In response to concerns about potential injury risk to out-of-position (OOP) women and children from deploying side airbags, the Alliance, the Association of International Automobile Manufacturers (AIAM), the Automotive Occupant Restraints Council (AORC), and IIHS used a joint working group to develop test procedures with injury criteria and limits to ensure that the risk of injury to OOP occupants from deploying side airbags would be very limited.

After an intensive effort, the working group developed a draft set of procedures. This draft was presented in a public meeting on June 22, 2000. Comments were collected and the finalized procedures were presented to NHTSA on August 8, 2000. Now, just 2 model years later, 60 percent of Alliance member company side airbags have been designed in accordance with the August 8, 2000 Recommended Procedures. More importantly, the field performance of side air bags remains positive.

These Procedures and public commitment were also used by Transport Canada as the basis for a Memorandum of Understanding (MOU) between automobile manufacturers and the Canadian government.

Another Alliance initiative is assessing opportunities, which may further reduce the frequency and consequences of rollover. Rollovers represent a significant safety challenge that warrants attention and action. In releasing the preliminary statistics for 2002, NHTSA stated that, "Fatalities in rollover crashes involving sport utility vehicles and pickup trucks accounted for 53 percent of the increase in traffic deaths." In addition, although not mentioned by NHTSA, an increase in passenger car rollover fatalities accounted for 25 percent of the increase in traffic fatalities. Indeed, rollover fatalities occurring with passenger cars, SUVs, and pickups all contributed roughly equally to the increase observed. In fact, the increase in number of passenger car rollover fatalities was nearly 8 times higher than might otherwise had been forecasted from the growth in the number of registered passenger cars in 2002, over 2001.

Consequently, Alliance efforts to reduce the frequency and consequences of rollover involve passenger cars as well as SUVs, vans, and pickup trucks. Our efforts include—developing a handling test procedure or recommended practice that will focus on an assessment of the performance of electronic stability control systems and other advanced handling enhancement devices. A typical rollover is one in which the driver becomes inattentive or distracted, loses control of the vehicle, and then strikes something that trips the vehicle, causing it to roll. Electronic stability control systems are designed to help drivers to keep out of trouble in the first place. However, should a rollover occur, the Alliance is assessing opportunities to enhance rollover occupant protection. We are assessing the current state of knowledge on injury causation during rollover crashes, and we are also working to determine the feasibility of developing test procedures to assess the performance of countermeasures designed to further reduce the risk of occupant ejection in rollover crashes.

Alliance members are also individually pursuing initiatives to enhance motor vehicle safety. One such initiative that has received widespread support is the installation of vehicle-based technologies to encourage safety belt usage. Preliminary research on one system deployed in the United States by one Alliance member found a statistically significant 7 percent increase in safety belt use for drivers of vehicles equipped with that system compared with drivers of unequipped vehicles. NHTSA estimates that a single percentage point increase in safety belt use would result in an estimated 250 lives saved per year. Beginning in model year 2004, all members of the Alliance began deploying various vehicle-based technologies to increase safety belt use. The rollout of these technologies will continue over the next few model years. These actions—in addition to saving lives—will provide valuable field experience concerning the absolute and differential effectiveness and acceptability of a range of safety belt use inducing systems. The experience gained will ultimately lead to future systems with enhanced effectiveness.

COMPREHENSIVE AND CURRENT DATA IS NECESSARY TO MAKE INSIGHTFUL AND SOUND PUBLIC POLICY DECISIONS

NHTSA's two key traffic crash database programs, the National Automotive Sampling System (NASS) and the Fatality Analysis Reporting System (FARS) provide crucial information to safety planners and vehicle design engineers. The NASS program, in particular, has been chronically under-funded. On October 17, 2002, the Alliance and various other safety groups sent a letter to NHTSA Administrator Dr. Jeffrey Runge outlining the importance of sound crash and injury data. The Alliance emphasized the need for additional funds for NASS in order to evaluate the effectiveness of both behavioral and vehicular safety measures. See Attachment 2.

The Administration has proposed substantial funding to upgrade state traffic records systems. Improved state record systems can help improve the quality of FARS data and assist states in establishing safety program priorities. The Alliance strongly supports upgrading state and federal crash data systems and urges Congress to provide appropriate levels of funding for them. The Alliance believes this funding is critical because future NHTSA rulemakings should be data-driven, sup-

ported by scientifically sound evidence, and demonstrate the potential for effective safety benefits without undesired side effects.

The Alliance also sponsors a significant amount of safety research that is shared with the safety community. The Alliance is sponsoring a program to collect-real world crash data on the performance of depowered and advanced air bags at three sites around the U.S. (Dade County, Florida, Dallas County, Texas, and Chilton, Coosa, St. Clair, Talledega, and Shelby Counties in Alabama). This program adds valuable information about air bag performance to the extensive crash data already being collected by NHTSA through NASS. The Alliance is committed to funding this program that will run through 2005. The current Alliance commitment for the advanced air bag research is $4.5 million over 4 years. The Alliance project will observe all the NASS data collection protocols so that the Alliance funded cases can be compared with, and evaluated consistently with, other cases in the NASS dataset.

In addition to adequate funding for NASS, the Alliance believes it important for NHTSA to have the resources necessary to conduct a comprehensive study of crash causation similar to the multi year "Indiana Tri-Level Study" that was completed 25 years ago. Researchers at Indiana University Bloomington's Institute for Research in Public Safety conducted the Tri-Level Study of the Causes of Traffic Accidents from 1972 through 1977. According to NHTSA officials, the Indiana Tri-Level Study has been the only study in the last 30 years to collect in-depth, on-scene crash causation data. NHTSA relies on it today because other NHTSA data is collected from police crash reports or collected days or weeks after the crash, making it difficult to obtain causation data. Significant advancements in vehicle safety technology and design have occurred since then, making this study rather obsolete as a baseline on which to base substantial regulatory decisions.

Therefore, the Alliance strongly supported the National Highway Traffic Safety Administration's FY 2004 budget request for $7 million and supports the FY 2005 budget request for $10.2 million, so that NHTSA can effectively update their crash causation data. An updated study would help guide and enlighten public policy aimed at reducing the frequency of traffic crashes, injuries, and fatalities. This is a crucial step toward improving the quality of data available to inform sound regulatory decision-making at NHTSA.

THE NHTSA MANDATED RULEMAKINGS IN THE SENATE PASSED HIGHWAY BILL PREJUDGE THE RULEMAKING PROCESS

The NHTSA reauthorization provisions in the Senate passed bill would mandate that more than 10 new major motor vehicle safety rulemakings would have to be enacted over the next 2-4 years. Each rulemaking must comply with a rigid, predetermined schedule for the NPRM and promulgation of the final rule. Most of the rules would cover all vehicles up to 10,000 pounds GVWR (which includes a large number of incomplete vehicles).

The Alliance strongly opposes the mandated rulemakings in the Senate bill. While we support and participate in the rulemaking process, we firmly believe that any final rule, if appropriate, should be based on sound data, public comment, consideration of economic consequences and provide appropriate lead-time. By requiring that rules must be issued on specific subjects, regardless of the public rulemaking record on that subject, the Senate bill's approach to improving safety could actually result in less safety by forcing NHTSA and the industry to forego rulemaking and products decisions on higher priority items.

In addition to prejudging the outcome of the rulemaking process, the Senate bill also sets unrealistic deadlines, both in terms of the Safety Act's requirement that NHTSA promulgate objective and practicable standards that meet the need for motor vehicle safety and vehicle manufacturers' ability to redesign vehicles to meet the new requirements. The bill also provides little flexibility for problems or conflicts in setting new standards covering many aspects of future vehicle designs that are typically encountered in rulemaking.

By mandating that new and far-reaching rules be issued regardless of the public record in the rulemaking proceeding and independent of data and analysis that identify future, as compared to prior, safety problems, the Senate bill would override the safety priorities that NHTSA has developed through an elaborate public process as well as the priorities of manufacturers in bringing new safety technology to the market as quickly as possible. And, by mandating that rules be issued regardless of the public record in the rulemaking, the potential for unintended consequences—which NHTSA itself has identified in testimony on the Senate bill increases.

The complexity of safety rulemakings requires that careful attention be accorded to the inherent tradeoffs associated with regulations. In the past, we have seen

tradeoffs among adult high-speed protection in frontal crashes and associated harm to children in low-speed crashes. The March 6, 2004 Status Report, by the IIHS notes that the 1997 rule issued by NHTSA that allowed manufacturers to produce "depowered" air bags was the right decision then and still is now. In designing occupant restraint systems, manufacturers must carefully balance high-speed and lower-speed protection, protection for belted vs. unbelted occupants, and protection for large adults and smaller adults and children. All involve safety tradeoffs. The subjects in the Senate bill require tradeoffs between what is known as "self-protection" vs. "partner protection" (i.e., protection in the subject vehicle vs. the potential harm posed by the design of that vehicle when it crashes into other vehicles), whether stronger roofs might result in a higher rate of rollover because of added structure to the top of the vehicle, as well as whether window treatments to reduce ejections for unbelted occupants could lead to increased head and neck injuries to belted occupants. The "expert" agency established by the Congress to address these issues—NHTSA—should make regulatory decisions based on a sound public record, and not based on arbitrary deadlines.

THE POTENTIAL BENEFITS OF VEHICLE SAFETY TECHNOLOGIES CAN NOT BE FULLY REALIZED UNTIL VEHICLE OCCUPANTS ARE PROPERLY RESTRAINED AND IMPAIRED DRIVERS ARE OFF THE ROAD

Motor vehicle safety is a shared responsibility among government, consumers and vehicle manufacturers. Auto manufacturers are more committed than ever to developing advanced safety technologies to reduce fatalities and injuries resulting from motor vehicle crashes. But as a nation, we will never fully realize the potential benefits of vehicle safety technologies until we get vehicle occupants properly restrained and impaired drivers off the road. In this regard, Congress has a unique role to play by:

- Enacting incentives for states that pass primary enforcement safety belt laws and ensuring high visibility enforcement of these laws by providing adequate funding for paid advertising and Section 402 State and Community Highway Safety Programs;
- Providing funding beyond the level proposed to address the deadly problem of impaired driving; and
- Authorizing adequate funding for a modern, comprehensive study of crash causation and to update state and federal crash data systems.

ATTACHMENT 1

VOLUNTARILY INSTALLED SAFETY DEVICES

A partial list of voluntarily installed advanced safety devices (w/o or prior to regulation)

Crash Avoidance Advances—Tire/suspension optimization; Automatic brake assist; Electronic stability controls to help drivers maintain vehicle control in emergency maneuvers; Anti-lock brakes; Traction control; Obstacle warning indicators; Active body control; Intelligent cruise control; Convenience controls on steering wheel to minimize driver distraction; Automatic obstacle detection for sliding doors on minivans; Head-up displays; Child-proof door locks; and Automatic speed-sensitive door locks.

Vision—Automatic dimming inside mirrors to reduce headlamp glare; Heated exterior mirrors for quick deicing; Rear defrost systems, wipers; Headlamp wiper/washers; Automatic-on headlamps; Automatic-on headlamps when wipers are used; Infinitely variable wiper (only 2 req'd by regulation); Night vision enhancements; Advanced lighting systems; and Right side mirrors.

Crashworthiness Advances—Side air bags for chest protection; Side air bags for head protection that reduce ejection; Rollover triggered side/curtain air bags; Advanced air bags (e.g. dual stage inflators) several years in advance of regulatory requirements; Safety belt pre-tensioners; Rear center seat lap/shoulder belts; Load-limiting safety belts to reduce chest injuries; Improved belt warning indicators; Rear seat head restraints; Integrated child seats; Anti-whiplash seats; and Breakaway mirrors for pedestrian protection.

Post Crash—Automatic notification to emergency providers during air bag deployment.

ATTACHMENT 2

October 17, 2002

The Honorable JEFFREY W. RUNGE, M.D.
Administrator
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

RE: National Automotive Sampling System: Increased Funding

DEAR DR. RUNGE: Sound crash and injury data are critical components needed for advanced vehicle safety design and for both initiating and evaluating countermeasures for improving highway safety. The National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System provides comprehensive data on people dying in motor vehicle crashes throughout the United States. These data have enjoyed widespread use in the evaluation of many motor vehicle safety countermeasures and their effectiveness in reducing motor vehicle death. NHTSA's National Automotive Sampling System Crashworthiness Data System (NASS/CDS) is an essential resource that provides the agency, researchers, vehicle manufacturers—indeed the entire safety community—with a detailed crash and injury causation database suitable for identifying traffic safety issues, establishing priorities, assisting in the design of future countermeasures and for evaluating existing countermeasures.

The NASS/CDS provides in-depth crash investigations of a representative sample of police-reported tow-away crashes throughout the United States, so data can be weighted to provide a nationwide estimate of crashes of all severities according to the severity of injuries. Furthermore, researchers can examine the detailed crash investigations in depth to learn about crash characteristics and injury causation focusing on subsets of the data. For example, such investigations have proven to be of critical importance in the understanding of airbag performance—the conditions under which airbags save lives, but also when they contribute to occupant injury.

The application of sound science to improve traffic safety requires that real world data or field data be used wherever possible. The continuation of vehicle and highway safety improvements requires a solid factual basis. However, the essence of such investigations is timeliness. As the recent experience with frontal airbags has taught us, we need to understand as soon as possible how new vehicle technologies, such as airbags, are performing in the real world. And with new technologies being introduced at such a fast pace, it is now more important than ever to understand how these technologies are performing in the real world.

The agency's NASS/CDS database is one of the most comprehensive databases in the world to look in depth at the causes of motor vehicle injury. However, we are concerned that the budget for NASS has not kept pace with either the agency's informational needs or inflation. The NASS program has been constrained by either flat or reduced funding at a time when technological developments (e.g., advanced frontal and side air bags, telematics) and occupant behavior (from increased seat belt use to booster seat installations) are changing. We believe it is important to ensure that NHTSA continues to have the ability to evaluate actual field performance on a national basis.

Therefore, NASS must have the resources necessary to collect high-quality, real-world data by conducting investigations at the full complement of sites that will provide statistically valid, nationally representative data on a timely basis. The NASS reorganization of the mid 1980's called for 36 Primary Sampling Units. Currently, NASS has the resources to conduct investigations at only 24 sites. The effectiveness of NASS has also been subject to inflationary increases in operating costs of about 3-5 percent per year, which have been offset by reducing field staff. This has resulted in fewer cases reported from the 24 sites.

From the original projections of 7000 cases annually, NASS has been reduced to providing only about 4500 cases annually across the spectrum of crash types and severities. The result is that there are often too few cases of serious injury to make an informed decision about the sources and mechanisms of injury in motor vehicle crashes (for example, in side impacts, or in crashes involving children) without having to include data from many years of data collection. This blunts our ability to look at current issues in real time. We believe NASS should be funded at a level that will restore NASS to its design scope to ensure critical "real-world" data can be collected at a sufficient number of sites to produce the statistically valid, nationally representative sample originally intended. Initially, the NASS design called for 50 active sites.

Thus, we believe it is critical that the proposed NHTSA fiscal year 2004 budget include a request to fully fund NASS, so that our ability to evaluate the effectiveness of both behavioral and vehicular safety measures is enhanced. We stand ready to support you in this most important endeavor.

Sincerely,

JOSEPHINE S. COOPER, *President and CEO,*
Alliance of Automobile Manufacturers, Inc.

PHIL HASELTINE, *President,*
Automotive Coalition for Traffic Safety

TIMOTHY C. MACCARTHY, *President and CEO*
Association of International Automobile Manufacturers, Inc.

YVONNE MCBRIDE, *President*
Governors Highway Safety Association

HEATHER PAUL, *Executive Director*
National Safe Kids

SUSAN G. PIKRALLIDAS, *Vice President of Public Affairs*
American Automobile Association

CHARLES A. HURLEY, *Transportation Safety Group*
National Safety Council

SUSAN FERGUSON, *Senior Vice President, Research*
Insurance Institute for Highway Safety

Mr. STEARNS. I thank the gentleman.

Mr. Pittle, welcome.

STATEMENT OF R. DAVID PITTLE

Mr. PITTLE. Thank you, Mr. Chairman. Mr. Chairman and members of the subcommittee, good morning. My name is David Pittle. I'm Senior Vice President for Technical Policy at Consumers Union, the publisher of Consumer Reports. With me this morning is Sally Greenberg, CU's Senior Product Counsel here in Washington.

Consumers Union greatly appreciates the opportunity to be here this morning to express our views on this reauthorization bill. Consumer Reports has been testing and rating cars since 1936, the year our magazine was first published. We've always made safety a top priority in both our product tests and our published ratings. CU has a long history with speaking out on matters of auto safety and working with NHTSA and Congress to press for improvements on automobile safety, to identify safety priorities and to ensure that NHTSA is fulfilling the mandate on which so many consumers depend.

To ensure the most effective reauthorization, we recommend that the House join the Senate in adopting safety provisions in S. 1072 which will first and foremost save lives and reduce injuries, bring about badly needed safety improvements on auto design and give NHTSA the mandate it needs to address serious safety problems that in some cases have languished within the Agency for many years.

We've worked actively with Senators on both sides of the aisle to ensure that this is an effective bill and we look forward to doing the same here in the House of Representatives.

The Department of Transportation's data has been discussed earlier and I won't repeat it. But this is the highest number of motor vehicle fatalities in over a decade, 2002. No other witnesses testifying before you this morning may paint the bill as too ambitious or too expensive or requiring too much research. We take serious issue with those characterizations.

Dr. Runge himself said in a speech to the American Public Health Association, that there's a public health epidemic of highway death in this country and traffic crashes are the leading killer of children starting at age 2. This is what's killing our young people, killing our children and this is the third largest cause of deaths of potential life lost for all ages combined. And we agree with that assessment.

The safety measures contained in S. 1072 will prevent thousands of deaths and injuries. Moreover, many of the issues addressed in the bill have been heard this morning; within NHTSA, sometimes for decades. NHTSA first adopted tire standards in 1970 and then lower side impact protection in the 1970's. Seat belts have been required since 1968. And the means for getting people to use them have been studied forever.

Roof crush has been under discussions since 1971 and the standard for door locks and occupant retention was adopted in 1968, but technology has changed and injury patterns have changed. We desperately need improvements in these areas. In fact, the theme that comes through most profoundly as you read the safety provisions in S. 1072 is that this is a bill that is a serious effort to address the list of auto safety hazards that cost society thousands of lives each year. And as I've said, these problems have languished within NHTSA far too long and we need Congress to press the agency into action.

This is not an extreme bill. Indeed, Senators McCain, Hollings, Snowe and DeWine each have championed safety provisions in this legislation and the bill passed the Republican Majority Senate Energy and Commerce Committee unanimously. Four years ago, this committee held extensive hearings on the Ford Firestone related fatalities and out of those hearings, Congress enacted the landmark auto safety legislation known as TREAD. And TREAD directed NHTSA to address many important safety issues that had been put off for too long. They mandated dynamic rollover testing for consumer information program, upgrading Federal tire standards, requiring tire pressure monitors and developing an early warning system to flag safety defects before they became crises.

To NHTSA's credit, 4 years later, the agency has completed most of TREAD's ambitious list, though some rulemakings were unnecessarily weakened, but the major vehicle safety issues, SUV rollover, crash protection, roof crush, ejection and so on that actually caused those Ford Firestone deaths and injuries remain unaddressed. In short, there's much more to be done and S. 1072 tackles many of those issues head on.

Our written statement contains the details of why we support the various provisions. I would like to move now to taking a somewhat larger view of these provisions. They attempt to treat the current auto safety problems as an integrated whole. Roof crush, for example, is related to ejection and rollover crashworthiness, glazing, roof strength, head airbags. They're all interdependent and therefore we believe that NHTSA needs to address them as a whole. Otherwise, we have a change here or a change there that might preclude a safety fix in another related hazard.

S. 1072 directs NHTSA to take such a comprehensive approach.

I'd like to end my remarks with one final thought which I shared with the Senate Commerce Committee as well. Stepping back and looking at the bigger picture, we seriously question the wisdom of NHTSA's reliance on industry to self-regulate by setting its own voluntary commitments on some of these critical and lifesaving issues. While we recognize some past benefits of voluntary programs, in this case, we believe it would be misguided and inappropriate and worse, not likely to bring about the level of change needed to reduce the hazards in a timely manner.

Solving broad and serious safety problems is the fundamental reason why NHTSA exists in the first place. This is one of its core responsibilities. We all must be very cautious before we agree to let this key safety agency simply step aside and defer responsibility to the industry. NHTSA should act boldly to improve auto safety and do so in a manner that is accountable to the Congress, to the Courts and to consumers.

Mr. Chairman, Dr. Runge and the NHTSA staff need from you and this committee a reasonable, but firm and unambiguous message about the importance of its consumer safety mission and your intention to vigorously oversee their progress. You did exactly that in the Ford Firestone safety crisis and it was a success. Lives were saved as a result of your decisive action. Here, in light of the serious on-going and rapidly increasing pattern of death and injury, we call upon you for action once again.

We urge this committee to reject NHTSA's relying heavily on voluntary action by the industry. We urge you instead to direct NHTSA to step up to the plate and take the lead to act decisively and promptly to protect the public from these preventable risks.

[The prepared statement of R. David Pittle follows:]

PREPARED STATEMENT OF R. DAVID PITTLE, SENIOR VICE-PRESIDENT, TECHNICAL POLICY, CONSUMERS UNION

Members of the Subcommittee, Good Morning, my name is David Pittle, I am Senior Vice-President for Technical Policy at Consumers Union (CU), the publisher of *Consumer Reports.* With me this morning is Sally Greenberg, CU's Senior Product Safety Counsel here in Washington. Consumers Union greatly appreciates the opportunity to be with you here this morning to express our views on the reauthorization of the National Highway Traffic Safety Administration (NHTSA).

Consumer Reports has been testing and rating cars since 1936, the year our magazine was first published. We have always made safety a top priority in our product ratings, and the safety of automobiles is no exception. CU has a long history of working with NHTSA and Congress to press for improvements in automobile safety to identify safety priorities and insure that NHTSA is fulfilling its mandate.

Each year, CU conducts comprehensive tests of some 40 to 50 new vehicles that we buy anonymously at retail, and we provide consumers with ratings about performance, routine handling, fuel efficiency, reliability, comfort, braking, emergency handling, and safety features of these vehicles. CU also tests tires each year for their performance in braking, handling, cornering, and traction characteristics on dry, wet, snow-covered, and ice-covered surfaces. Each month, an estimated 17 million consumers read and consider our published test reports, product ratings, and buying advice as they ponder their choices.

The topic before the Subcommittee this morning is what form the NHTSA reauthorization legislation will ultimately take. The Senate bill, S. 1072, Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003 (SAFETEA), includes a number of important provisions that we think will bring needed improvements in the way cars are designed, and save lives in a cost-effective manner. This legislation will give NHTSA the kind of guidance we believe it needs to proceed with rulemaking in these areas. We have worked actively with Senators on both sides of the aisle to insure that this is a balanced bill that makes the most of this opportunity

to reauthorize NHTSA for the next six years. We urge the members of the Subcommittee to support this proposal.

Auto Safety Statistics and Funding

The U.S. Department of Transportation (DOT) data on traffic fatalities for the year 2002 was not encouraging. Overall, there were 42,815 deaths in 2002 compared to 42,196 in 2001, an increase of 619 deaths. This is the highest number of motor vehicle fatalities in over a decade. And although nearly 95 percent of all transportation-related fatalities are the result of motor vehicle crashes, NHTSA's budget is less than one percent of the entire DOT budget.

The current authorization funding level for NHTSA's entire motor vehicle safety and consumer information programs is only $107.9 million. Since 1980, the agency has been playing a game of catch-up. Today, funding levels for motor vehicle safety and traffic safety programs are not much higher than 1980 funding levels in current dollars.

Theme of Legislation

Though some may paint S. 1072 as too ambitious, too expensive, requiring too much research, we take issue with those characterizations. Dr. Runge himself said in a speech to the American Public Health Association last November, "There is a public health epidemic of highway death in this country," and "Traffic crashes are the leading killer of children starting at age 2. This is what is killing our young people, killing our children, this is the 3rd leading cause of years of potential life lost for all ages combined."

The safety measures addressed in S. 1072 will save thousands of lives and serious injuries. Moreover, many of the issues addressed in this bill have been under study and discussion within NHTSA for a decade or longer. NHTSA first adopted tire standards in 1970, lower side impact protection in the 1970s, seatbelts have been required in cars since 1968 and the means for getting more people to use them has been studied throughout, roof crush has been under discussion since 1971, a standard for door lock and occupant retention was adopted in 1968. In fact, the theme that comes through most profoundly as you read the safety provisions in S. 1072 is that this bill is a serious effort to complete the long unfinished auto safety agenda that takes thousands of lives needlessly each year. This is not an extreme bill. Indeed, Senators McCain (R-AZ), Hollings (D-SC) Snowe (R-ME), and DeWine (R-OH) each have championed safety provisions in this legislation, and the bill passed the Republican-majority Senate Energy and Commerce Committee unanimously and has now passed the full Senate.

Congressional Mandates are Most Effective in Generating NHTSA Action

Four years ago this Committee held extensive hearings on the Ford-Firestone highway safety crisis: hundreds of people had been injured and or were killed when the Firestone tires on their Ford Explorers peeled away at highway speeds. This bill that this Committee developed paved the way to enactment of landmark auto safety legislation, the Transportation Recall Enhancement, Accountability, and Documentation Act of 2000 (TREAD). TREAD directed NHTSA to address many important safety issues that the agency had put off for too long, including dynamic rollover testing, upgrading tire standards, and development of an early warning system to flag safety defects before they become crises.

To NHTSA's credit, four years later the agency has completed TREAD's ambitious list of Congressional mandates. (The one exception is the tire pressure monitoring rulemaking, which NHTSA did complete but which was subject to a lawsuit brought by several safety groups, not including Consumers Union, and the agency is currently revising the rule.)

The lesson here is that NHTSA, with many safety issues on its agenda, does its work most effectively and efficiently when it has a Congressional mandate to move forward with the rulemaking process, enlist the public's input, and ultimately to publish a final rule that will save lives in a cost-effective manner. History shows that when Congress does not direct the agency to address a specific problem, as was the case in four important safety regulatory areas described in one of this bill's predecessor, the Intermodal Surface Transportation Efficiency Act of 1991, (ISTEA), the result is either no final rule or only a weak final rule. The examples from ISTEA are listed below:

- Congress did not require a final rule adopting a rollover standard; NHTSA issued an Advance Notice of Proposed Rulemaking (ANPRM) but withdrew it;
- Congress did not require an upgraded rule for improved safety belt design—NHTSA issued a rule requiring adjustable anchorages but only in front outboard seating;

- Congress did not require NHTSA to adopt a 10-year old test dummy in the federal regulations; NHTSA didn't act, though a subsequent law passed by this Committee, Anton's Law, now says it must initiate rulemaking by December 2005.
- With Congressional guidance and direction, however, NHTSA is quite capable of developing standards that help save lives, and make our cars and roadways safer. I'd like to direct your attention to the various safety provisions in S. 1072 and explain why CU urges your support for them.

SEC. 4156—IMPROVED CRASHWORTHINESS

Roof Crush Standard

The 33-year old standard for roof strength is woefully out of date and does not provide basic crashworthiness protections for occupants in vehicles that roll over. The auto industry and government have known about the deadly consequences of vehicle roof crush since 1960s, yet have never upgraded the 1971 standard nor extended it to vehicles weighing more than 6,000 lbs. Further, roof crush injuries occur often to those who have followed the rules and buckled their seatbelts. Drivers who experience a rollover often sustain grave injuries despite being belted because of the vehicle's poor roof integrity. NHTSA's failure to upgrade the roof crush standard allows these injuries to mount year after year.

The *Detroit News* in a 2003 series "Deadly Driving" highlighted the failure of NHTSA to upgrade its roof strength standard and noted that 1,400 deaths and 2,300 serious injuries could be prevented each year if the standard were more rigorous.

NHTSA itself has estimated that 1,339 serious or fatal injuries caused by roof crush intrusion are suffered by belted occupants each year. While the agency has put out a notice and request for comment on roof crush resistance, no proposal for rulemaking for an upgraded standard has been issued. NHTSA lists a proposed rule to upgrade roof crush resistance as a possible 2004 action, and final rule as a possible 2005 action, in *Vehicle Safety Rulemaking Priorities and Supporting Research 2003-2006,* with little description of a rule's possible contents. We recommend speeding up this process and therefore support S. 1072's provisions to upgrade the roof crush standard.

S. 1072:

Sec. 4156—Improved Crashworthiness :

- *Requires NHTSA to issue a rollover crashworthiness standard and requires the Secretary to consider a roof strength standard based on a dynamic test, and to consider improved seat structure and safety belt design (including seat belt pretensioners and load limiters), side impact head protection airbags, and roof injury protection measures.*

Vehicle Crash Ejection Prevention

According to NHTSA about 7,300 people are killed each year and tens of thousands are injured, nearly 8,000 suffering severe injuries, because of partial or complete ejection through passenger vehicle doors, windows, and even moon roofs.

NHTSA researched anti-ejection glazing for years, estimating that up to 1,300 lives could be could be saved each year by anti-penetration side window glazing, yet suddenly decided that there were insufficient benefits from the use of anti-ejection glazing and discontinued the rulemaking.

The agency also has not acted to upgrade the outdated standard for door latches and locks that has remained unchanged since NHTSA first adopted an industry standard in the 1960s. Many doors still fly open in front, side, rear, and rollover crashes. In recent years, about 2,500 deaths and nearly 2,000 serious injuries occurred annually due to door ejections. Side door ejections are the second leading cause of ejections in all types of crashes, exceeded only by ejections through fixed glazing.

S. 1072:

- *Requires NHTSA to issue a rule to reduce complete and partial occupant ejection from passenger vehicles;*
- *Agency to consider ejection mitigation capabilities of safety technologies such as advanced side glazing, side curtains, and side impact air bags;*
- *Requires NHTSA to issue a rule to address improvements in door locks, latches and other ejection reducing components;*
- *Notice of Proposed Rulemaking (NPRM) to issue by June 30, 2006, final rule due 18 months later (Dec. 30, 2007).*

Vehicle Rollover

Rollover crashes result in a tragedy of massive proportions, with more than 10,000 deaths and hundreds of thousands of serious or crippling injuries to Americans each year. Rollover crashes represent only 3 percent of all collisions but account for 32 percent of all occupant fatalities. Light trucks, because they are higher and thinner vehicles, have a higher center of gravity and are more prone to rolling over in emergency situations.

The proliferation of SUVs on our roads since the start of the 1990s, with their numbers actually more than doubling during this period, has been accompanied by a doubling of fatal rollover crashes.

The results of NHTSA's annual Fatal Analysis Reporting System (FARS) for 2002 showed an increase in deaths and injuries due to rollover crashes—from 10,130 in 2001 to 10,666 in 2002—with almost half of them due to an increase in fatal rollover crashes by SUVs and pickup trucks. In fact, from 2001 to 2002, our nation suffered an astounding 10 percent increase in SUV rollover deaths alone in just one year. There was also from 2001 to 2002 a considerable increase in passenger vehicle rollover deaths overall—78 percent of that increase occurred in crashes involving SUVs and pickup trucks.

Six of every 10 deaths in SUVs in 2002 occurred in rollover crashes. No other passenger vehicle has the majority of its deaths take place in rollovers. By contrast, the great majority of deaths in passenger cars—more than 75 percent—occur in other crash modes.

CU's History in Rollover Prevention Efforts

Nowhere has CU's experience with NHTSA inaction and ineffectiveness been more vivid than with the issue of rollover prevention. In 1973, NHTSA announced its intention to consider a standard "that would specify minimum performance requirements for the resistance of vehicles to roll over in simulations of extreme driving conditions encountered in attempting to avoid accidents." The agency never set such a standard, despite considering the rollover issue for the next 31 years.

In 1988, NHTSA granted a CU petition in which we urged the adoption of a minimum stability standard to protect against unreasonable risk of rollover in all vehicles. The agency said at the time that the petition was "consistent with the Agency's steps to address the rollover problem." But NHTSA backed away from setting a standard. In fact, in 1994 NHTSA halted rulemaking on a universal minimum-stability standard, concluding that a standard applicable to all vehicles would require the redesign of nearly all SUVs, vans and pick-up trucks—at an unacceptably high cost.

In 1996, Consumers Union once again petitioned NHTSA, asking for the development of a consumer information program that would produce meaningful, comparative data on the rollover characteristics of different makes and models of SUVs. We asked that this information be made available to consumers. NHTSA granted CU's petition for a consumer information program, calling CU a "welcome partner" in the quest for improved rollover safety.

The end of this long three decade-plus saga is that not until Congress mandated in TREAD that NHTSA develop a dynamic test for a rollover consumer information rating program did NHTSA to develop such a test. Today NHTSA uses a "fishhook" maneuver to evaluate vehicle rollover resistance. That test is now combined with another measure, the Static Stability Factor, to arrive at rollover consumer information ratings, which are available to consumers on NHTSA's website and published in Consumer Reports magazine as well as ConsumerReportsOnline.org. As noted above, Consumers Union has supported a standard for rollover resistance. There is currently no standard. What we have today, instead, is a consumer information program that involves testing vehicles and publishing comparative vehicle rollover resistance ratings. But there is public support for a rollover resistance standard. According to a Louis Harris poll commissioned by Advocates for Highway and Auto Safety, 85 percent of Americans support a federal minimum standard for rollover prevention.

CU believes that setting a rollover resistance standard is far more easily accomplished today than it might have been even three years ago. NHTSA has done the hard work of developing a repeatable dynamic rollover resistance maneuver. The fishhook test that NHTSA is currently using is tough and rigorous, and could be the basis for a rollover standard that has consistently eluded the agency. Our engineers have also found in our testing that vehicles with aggressive electronic stability control systems (ESC) (also called vehicle stability control systems or VSC), have better emergency handling characteristics and are far less prone to rollover than vehicles without this feature, and CR recommends that ESC be standard equipment in all light trucks. However, NHTSA has never formally tested and evaluated this

relatively new technology that is finding its way into more and more vehicles. We support S. 1072's direction to NHTSA to report on electronic stability control systems as warranted and sensible.

Finally, CU believes that any vehicle that tips up in NHTSA's fishhook maneuver testing should be regarded as falling below the minimum standard for rollover resistance. In NHTSA's testing, only two vehicles tipped up. Consumer Reports will not recommend any vehicle that tips up in NHTSA's fishhook test.

S. 1072:

Sec. 4156—Improved Crashworthiness :

- *Requires issuance of a rollover resistance standard that includes improvements on the basic design characteristics of passenger vehicles to reduce rollover, and requires NHTSA to consider additional technologies to improve vehicle handling including electronic stability control systems;*

Aggressivity and Vehicle Compatibility

NHTSA has been looking at the issue of vehicle compatibility for 30 years; outside groups and researchers have identified vehicle compatibility as a serious safety issue as well.

- In 1974, NHTSA presented a paper on aggressivity calling for safer bumpers for heavy cars.
- In June 1998, NHTSA Administrator Dr. Ricardo Martinez announced that NHTSA research and crash tests showed that vehicle mismatch between cars and lights trucks was causing as many as 2,000 additional deaths each year on American roads. In response, the auto industry, including Ford Motor Company, promised Dr. Martinez that it would make modifications to achieve safer designs, mainly by adjusting vehicle suspension.
- In 1999, an Insurance Institute for Highway Safety study found that for every million registered cars weighing between 3,500 and 3,900 pounds, 45 deaths occur in vehicles struck by these cars while 76 deaths occur in vehicles struck by SUVs in the same weight class. While occupants of a car hit in the side by another car are seven times more likely to die than people inside the striking car, the fatality rate of car occupants is twenty-six times higher when the car is broadsided by an SUV or pickup truck. IIHS concluded that changing vehicle geometry and design can improve compatibility.
- In March of 2002, aggressivity research done by Marc Ross, of the University of Michigan, and Tom Wenzel, of Lawrence Berkeley National Laboratory for the Department of Energy, showed that vehicle design played a large role in the amount of risk a vehicle imposes on other vehicles on the road and charted make/model differences using real-world crash data.
- In 2002, NHTSA research contractor Hans Joksch published a report, *Vehicle Design versus Aggressivity,* showing that more than 445 people died in 1996 in collisions with light trucks who would not have died if the other vehicle in the collision was a car *of the same weight.*
- Last year, NHTSA released its "2002 Annual Assessment of Motor Vehicle Crashes" and noted that between 2001 and 2002, the number of car occupants who died in two-vehicle crashes with a light truck (SUV, van or pickup) increased (to 4,465) while the number of fatalities in the light trucks decreased (to 1,125). NHTSA also found that in two-vehicle crashes between cars and light trucks the car occupants were 3.3 times more likely to be killed in a head-on collision and 20.8 times more likely to die in a side impact (with the LTV hitting the side of the car).

Last December, the Alliance of Automobile Manufacturers, at the urging of the NHTSA Administrator, announced a *voluntary program* to address SUV aggressivity issues. The program proposed to phase in side air bags by 2007, as well as phasing in lower light truck bumper heights and perhaps lower frame-rail heights for the tallest pickups and sport-utility vehicles. The plan failed to address light truck design problems, however, such as the steel bars and frame-on-rail construction, which make light trucks vehicles more damaging to vehicles they strike in crashes than if they had a unibody construction.

Cautionary Note on Voluntary Industry "Commitments" and Auto Safety

A cautionary note is warranted here on voluntary commitments and auto safety regulations. As with any voluntary effort, there is no requirement that all vehicles comply, nor is there an outside body, like NHTSA, to verify vehicle adherence. Further, consumer groups, educators, independent experts, and others have no regular input into the development of the voluntary agreement, nor can the public offer comments on such a voluntary effort, as they would with a federal mandatory rule.

The voluntary plan on vehicle compatibility offers no procedural or judicial oversight, no mechanisms for accountability, and no baseline for safety. Voluntary commitments, because they are developed by a consensus within the industry, also suffer the real possibility of being adjusted downward to ensure that all members in the industry can still conform.

We argued last year before the Senate Commerce Committee, when the industry embarked on the voluntary effort for compatibility, that if NHTSA were going to recommend action on vehicle compatibility, it should do so through it's statutorily granted regulatory powers, developing a mandatory standard to which all vehicles must comply. I know, for example, that IIHS's director, Brian O'Neill, whom I respect and consider a friend and colleague, was instrumental in formulating the voluntary program with the Alliance of Automobile Manufacturers. He and I will simply have to disagree. The argument in favor of voluntary programs is that they achieve the desired results more quickly than can mandatory standards. We hasten to point out, however, that the 2003 voluntary compatibility document agreed to by the automakers for head injury and for less aggressive bumper designs do not call for 100% automaker conformity until 2010. That means that automakers have 7 years to bring their vehicles into conformance. We would hardly call that a "fast track." And, unless the agency commits the resources to developing in-depth expertise and research, it cannot properly and independently evaluate the effectiveness of the voluntary program.

Moreover, what is lost in the process? Vehicle compatibility is simply too important an issue to be left to a voluntary effort. CU believes that the public's substantive and procedural rights to participate in regulatory matters that affect its safety are absent when automakers set their own agreements, and the democratic process is the worse for it.

S. 1072:

Sec. 4155—Aggressivity and Incompatibility Reduction Standard

- *Requires NHTSA to issue a safety standard to reduce vehicle incompatibility/aggressivity which shall consider factors such as bumper height, weight, and design characteristics to manage crash forces in frontal and side impacts;*
- *Requires development of a standard metric to evaluate and rate comparative incompatibility/aggressivity among different vehicles;*
- *Requires development of a public information program including ratings based on risk to vehicle occupant and risk to occupants of other vehicles;*
- *NPRM to be issued by Jan. 31, 2007, final rule due 18 months later (July 31, 2008).*

Sec. 4173—Child Safety

Power Windows: In the past two years, six children have died when power windows closed on their necks, strangling them, according to the nonprofit safety group, Kids and Cars, the only source for data on this problem. I'd like to submit for the record Consumer Reports' (CR) article on power windows from our August 2003 issue. CR found that the vast majority of European and Japanese vehicles have a safe power window switch design that prevents a child from accidentally closing the window on his or her neck, and have featured that design for a number of years. A number of cars have an added safety feature in their power windows, an auto-reverse or "pinch-proof" device that uses sensor technology that reverses the window if it meets with minimal resistance. Unfortunately, the American automakers have lagged behind, with many continuing to feature a window switch that can be inadvertently operated by a child leaning out the window with her or his knee pressed against the switch. Indeed, the 2004 Ford Explorer, which is marketed as a family vehicle, and other 2004 models have the old-fashioned design. NHTSA, for its part, has failed to upgrade its 1991 standard on power windows, proposing a change in 1996 but failing to complete the rulemaking to this day.

We noted NHTSA Administrator Jeff Runge's comment in *The Washington Post* on Tuesday of this week (March 16, 2004) relating to the power window problem. "It's ripe for regulation or voluntary action," he said. "I think this problem will resolve itself."

This statement left us dumbfounded. The safer power window designs have been around and in widespread use for over a decade. The American automakers have failed to incorporate them across their fleet of vehicles. Even with the increased publicity about the dangers of power windows on such prime time news programs as NBC's Today Show and ABC's Good Morning America, a number of 2004 American automaker's cars feature the old designs that pose a hazard to children. This is a matter that obviously cannot and must not be left to a voluntary standard. CU believes NHTSA can and should put a standard in place to fix this safety haz-

ard(and should do so quickly. The numbers of deaths may be small, but they should be zero. Moreover, the death of a child scars a family for eternity. We have the technology to prevent these predictable, yet preventable tragedies—and we should use it.

S. 1072:

Sec. 4173—Child Safety

- *Requires report to Congress on technologies that reduce injuries from power windows to unattended children left inside motor vehicles;*
- *Requires completion of pending rule on design of power window switches and issuance of performance-based regulations to reduce accidental closing of power windows by children within 180 days of enactment, with regulation to take effect not later than Sept. 1, 2006;*

Backover warning devices research

Last year, at least 72 children, more than one every week, according to Kids and Cars, were backed over and killed, often by a parent or caregiver and often in their own driveway. In 2002 that number was 58. Parents involved in these tragedies say they looked as they backed up but because the child was in the vehicle's blindspot, it was impossible to see them. Consumers Reports has begun measuring blindspots for every vehicle we test and reporting on its the width and length. I'd like to submit for the record CR's April 2003 article on blindspots. We were shocked to learn that for a woman at 5'1", the blindspot in a Chevrolet Avalanche, a pickup truck was 51 feet in length. For 51 feet behind her, the driver could literally not see anything 28 inches or shorter. This problem is sure to become more serious as the fleet becomes dominated by larger, longer and higher light trucks.

Consumer Reports also tested backup warning devices and cameras, and found some were more effective than others in detecting objects behind vehicles. I'd like to submit for the record our October 2003 ratings of these devices.

We have already seen an increase in backover deaths to children from 2002 to 2003. We need to give parents the technology they need to do what they want to do anyway—there is no behavioral problem to change in saving lives in this instance—avoid hitting a child they cannot see behind them. CU supports making backup warning devices standard equipment in all larger vehicles, and we'd like to see these devices in all vehicles eventually. As we said above in relation to power windows, the numbers of deaths may not be spectacular, but they should be much closer to zero. Again, we should use technology to prevent these predictable, yet preventable tragedies.

S. 1072:

Sec. 4153—Vehicle Backover Avoidance Technology Study

- *Requires NHTSA to study methods to reduce death and injuries resulting from vehicles backing into pedestrians expecially children;*
- *Requires the study to analyze and compare backover prevention technologies, and provide estimated cost benefits of reduction in deaths, injuries, and vehicle damage;*
- Study to be submitted to Congress one year from enactment

Data Collection for Non-Crash, Non-Traffic Automotive Events

NHTSA has the authority to gather data for non-traffic, non-crash events—injuries in vehicles in parking lots, on a highway shoulder or in a driveway, like backover or power window incidents— but has consistently declined to do so. The only source for data about injuries to children in and around cars comes from the children's safety advocacy group, Kids and Cars. Janette Fennell, founder and president of the organization, has collected incident data involving children injured or killed in and around cars for seven years, and has done so at no cost to the government. Nevertheless, NHTSA has resisted collecting these data and adding them to its renown Fatality Analysis Reporting System (FARS), arguing that doing so would cost too much.

We are chagrined that our federal highway and auto safety agency, rather than working with groups like Kids and Cars to better understand safety hazards, instead question the validity of such group's data. A *Washington Post* article Tuesday, March 16, 2004, quoted a NHTSA official as saying, "But officials said Fennell's figures are probably overstated." Fennell's database consists of actual news accounts of accidents and is open to any who wants to see it. Such remarks by a federal safety regulator is a disservice to the concerned citizen who tries to fill an obviously gaping hole in the federal safety net.

Omitting information about deaths and injuries from the federal database, and keeping fatalities in non-crash, non-traffic events out of FARS data, deprives regulators of information they need to make regulatory and recall decisions. We support the provisions in S. 1072 to direct NHTSA to begin to collect these data.

S. 1072:

Sec. 4154 "Vehicle Backover Data Collection (Deaths and Injuries In Non-Traffic Non-Accident Incidents)

- *Authorizes NHTSA to establish a method to collect and maintain data on the number and types of injuries and deaths involving motor vehicles in non-traffic, non-accident incidents.*

Sec 4173 -Child Safety

- *Requires new database to collect data on injuries and deaths from non-traffic, non-crash events involving motor vehicles, and specifies that the database will be available to the public.*

Side Impact Protection

About 10,000 people die each year in both single- and multiple-vehicle collisions involving side impacts, even though many of these deaths could be prevented by improved side impact safety standards. Side impact crashes have increased in both severity and the number of deaths over the past decade due to the explosive growth in the number of light trucks on the roadways. We are concerned that too many light trucks were designed without much regard for the damage they will inflict smaller or lighter vehicle, in a collision.

The National Highway Traffic Safety Administration has made little progress towards improving side impact occupant protection, despite proven technologies such as side air bags. Improvements for both lower and upper side impact collisions are necessary to provide the protection occupants need in these crashes. Unfortunately, NHTSA has not acted when it has had the opportunity to strengthen both side impact safety regulations, Standards No. 201 (upper interior head impact protection) and 214 (lower interior side impact protection). The agency adopted a weak lower interior side impact standard, No. 214, in 1995 that only extended the requirements for a dynamic test to light trucks and vans 6,000 pounds or less gross vehicle weight rating. It also adopted a moving barrier test for hitting SUVs, pickup trucks, and vans in their sides that was only equal to the weight and size of a mid-size car, even though NHTSA made it clear in Federal Register notices that it actually favored using a taller, stiffer, heavier barrier perhaps weighing as much as 3,600 to 4,000 pounds.

As for Standard No. 201 governing upper interior head impact protection, the agency recognized in the late 1990s that side impact air bags were being used by the vehicle manufacturing industry to protect occupants from lethal head injuries, but it only adopted an optional test for using this crucially important safety technology. In the case of both standards, manufacturers can often meet the weak compliance requirements with little or no changes to how they already are making passenger vehicles or by using inexpensive foam padding added to both the upper and lower sides of vehicle interiors. Most importantly, no side impact air bags are required by the agency or even fostered by the weak compliance requirements of both standards. However, S.1072 addresses the deficiencies of both standards.

S. 1072:

Upper Interior Side Impact Head Protection (FMVSS No. 201):

- *Requires the evaluation of additional barriers and measurements of head and neck injuries, consideration of the need for new dummies for full range of occupants and a review of Insurance Institute for Highway and Safety criteria.*

15-Passenger Vans

Senator Olympia Snowe (R-ME) championed this issue in the Senate Commerce Committee after a terrible crash in her state, stating that "I quickly learned that this was the latest in a long line of deadly crashes involving the popular vans, which were initially designed to carry cargo rather than passengers and are highly prone to rollovers, especially when fully loaded." Senator Snowe introduced legislation to require NHTSA to include 15-passenger vans in their New Car Assessment Program (NCAP) rollover resistance ratings, and to test vans at various load conditions.

15-passenger vans currently fall into a regulatory black hole. Because they carry over 10 passengers, they are categorized as a bus, but they are far smaller than motor coaches, which are lightly regulated for safety purposes. Fifteen-passenger vans also need not meet small school bus standards, which are far stronger. Fur-

thermore, because they are not passenger cars or multipurpose passenger vehicles, 15-passenger vans are exempt from a number of federal motor vehicle safety standards (FMVSS), including the following:

FMVSS 201: interior impact;
FMVSS 202: head restraints for rear seats;
FMVSS 206: for door locks and retention;
FMVSS 214: for side impact dynamic testing; and
FMVSS 216: for roof crush resistance.

Their lack of crash protection under key standards is particularly hazardous because 15-passenger vans are highly prone to devastating rollover crashes, and often carry school sports teams, van pools, church groups and pre-school and school-age children. In a November 2002 letter, Public Citizen asked NHTSA close this safety gap by applying crash protection standards to these vehicles. To date, the agency has taken no remedial action in response to that letter.

NHTSA has sent out letters over the past decade to National Automobile Dealers Association, state directors of pupil transportation, and independent education groups outlining the Federal requirements for school bus safety and NHTSA's policy that pre-school and school aged children not being transported in 15-passenger vans due to safety concerns. NHTSA also released a Research Note on the rollover propensity of 15-passenger vans finding that, for example, a fully loaded 15-passenger van had 6 times the rollover risk, in a single vehicle accident, than the same van with only 5 passengers and issued a Consumer Advisory warning consumers about the risks of 15-passenger vans, but NHTSA has declined to impose regulations on these vans.

The prevalence of 15-passenger vans, their propensity to roll over when carrying heavy loads, and their use as transportation for children and students demand that we close the loopholes and bring these popular people-movers under all appropriate federal safety regulations.

S. 1072:

Sec. 4157—15-Passenger Vans

- *Requires NHTSA to issue a final rule by Sept. 31 [sic], 2005, requiring15-passenger vans to meet all existing and prospective safety standards for occupant protection and crash avoidance relevant to such vehicles;*
- *Requires NHTSA to issue a final rule by Sept. 31 [sic], 2005, to include 15-passenger vans in the New Car Assessment Program (NCAP) rollover resistance program;*
- *Requires evaluation of technology that would improve driver control of 15-passenger vans.*

Sections throughout the bill:

- *Require that new safety standards for ejection, rollover prevention and rollover crashworthiness are applicable to vehicles weighing up to 10,000 lbs.*

Tire Safety Standards

Mandated to do so under TREAD, NHTSA issued a final rule in June 2003 to improve tire safety, concentrating on tire endurance and speed performance to reduce failure and extend the standard to tires used by light trucks and vans. However, the agency left areas of the proposed standard unfinished, including important safety issues such as reducing failure from tire impacts with road hazards, improving tire resistance to unbeading, and controlling tire failure because of gradual deterioration during tire service life. The agency also has not addressed the issue of wet weather anti-skidding performance, an issue specifically directed by Congress in separate legislation.

CU supports efforts to complete the process of setting effective standards for tires. For example, on modern low profile tires, the plunger and unseating tests are not effective. The current tire strength and bead unseating tests do a poor job of evaluating low profile radial tires-radial tires; these tires too easily pass these tests. In fact, tire strength and bead unseating tests were designed around bias tire technology common in the sixties. Consumers Union supports new testing methods that will set an effective minimum standard for radial tires. We also support a tire aging test. This test is not a sell-by-date requirement; rather it is a laboratory method of rapidly aging the tire using heat or some other means (e.g., "cook" the tire in an oven) and then evaluating belt adhesion using a tensile pull test or wheel test. We understand that Ford Motor Co. has been working on an aging test and reported recently that "aged" tires often perform better on high speed wheel tests because the rubber is stiffer, allowing the tire to run cooler.

S. 1072

Sec. 4158—Additional Safety Performance Criteria for Tires

- *Requires NHTSA to issue a tire safety performance standard that includes criteria for strength and road hazard protection, resistance to bead unseating, and aging;*
- *Requires NHTSA to reconsider the decision not to require use of shearography analysis;*

NPRMs to be issued by June 30, 2005, for strength and hazard protection, and by Dec. 31, 2005, for aging and bead unseating, with final rules due 18 months after each NPRM (Dec. 30, 2006 and June 30, 2007, respectively).

Seat Belt Reminder Technology

According to the U.S. Department of Transportation (DOT), seat belts save 13,000 lives each year, but 7,000 people die because they do not use seat belts. In 2001, 73 percent of restrained passengers involved in fatal crashes survived, compared to 44 percent of unrestrained occupants. More than half of all highway fatalities occur among people who are not wearing seat belts. The deaths and injuries that result from non-use of safety belts cost society an estimated $26 billion annually in medical care, lost productivity and other injury-related costs.

The importance of seat belts in saving lives is indisputable. We should do everything possible to get people to buckle up. European vehicle manufacturers employ seat belt use reminder systems using chimes and other audible sounds, which become more insistent based on increasing vehicle speed or distance driven. In 2003 the National Academy of Sciences conducted a study of new seat belt reminder technologies for NHTSA, recommending, among other actions, that all new light-duty vehicles be equipped with an enhanced belt reminder system that includes an audible warning and a visual indicator for front seat occupants and that the current 4-8 second limitation on audible warnings be amended to remove the time limit. (CU's Auto Test Division Director, David Champion, was a member of that NAS panel.) *See Buckling Up: Technologies to Increase Seat Belt Use,* Transportation Research Board Special Report No. 278 (prepublication copy available online at http://trb.org/publications/sr/sr278.pdf.

CU believes we need to enhance the reminders drivers and their passengers now receive to buckle up.

S. 1072:

Sec. 4159—Safety Belt Use Reminders

- *Requires NHTSA to issue a rule to encourage driver and passenger seat belt use;*
- *NPRM to be issued within 12 months and final rule within 24 months;*
- *Permits regulations that require or permit seat belt/ignition interlocks and use of seat belt reminder systems with audible buzzer that lasts longer than 8 seconds.*

Administration's Opposition to Effective Seat Belt Legislation

We wish to make one additional observation on improving seat belt usage. CU believes there is a disconnect in this Administration's stance on seat belts. Secretary of Transportation Norman Mineta and NHTSA Administrator Jeffrey Runge, who testified earlier this morning, have each stated that increased seat belt use is an Administration priority and each has acknowledged the importance of primary seat belt laws. In November 2003, Secretary Mineta said in a press release, "I urge states to enact primary safety belt use laws because they have been proved effective in convincing people to buckle up. Saving lives is one of the Bush Administration's highest priorities." NHTSA's administrator, Dr. Jeffrey Runge, as well, has continued to stress the importance of getting motorists to buckle up in order to save lives. "It would be impossible to overstate the lifesaving and dollar saving impact of increases in safety belt use. It remains vitally important that all of our citizens buckle up," he said last year.

Yet this Administration has declined to support a bipartisan effort to motivate states to enact primary seat belt laws. S. 1993, the National Highway Safety Act of 2003, introduced in February of this year by Senator John Warner (R-VA) and Senator Hillary Clinton (D-NY), is supported by over 130 national, state and local groups representing consumer, health, safety, medical and child advocacy organizations, the insurance industry, the auto industry, law enforcement, African-American mayors and state legislators, and drunk driving victims. The bill aims at getting states to enact a primary enforcement seat belt law or raise its seat belt use rate to 90 percent. If a state fails to accomplish one or the other within three years, it faces the loss of two percent of their federal highway funding, growing to four percent in subsequent years. The administration apparently won't support the bill be-

cause it contains penalties for noncomplying states. We cannot understand this decision. It does not appear that the Administration is opposed, as a matter of principle, to sanctioning states. Indeed, the 2002 No Child Left Behind Act, considered a landmark bill for this Administration, includes a number of sanctions for schools whose students don't meet testing standards.

Moreover, the sanctions in S. 1993 mirror those in other highway safety bills. For example, federal law encouraging each of the states to pass a 0.08% blood alcohol level laws has a sanctions provision. That law has been very effective getting the states to take action. We believe the Administration's failure to back S. 1993, on one hand, and its statements about the importance and value of primary seatbelt laws, on the other, is inconsistent and we respectfully suggest that it reconsider its position and throw its weight behind S. 1993, National Highway Safety Act of 2003.

This subcommittee has an important responsibility here today. Each of the provisions we have highlighted will help to save lives, but without Congressional action that ensures they become law, we are concerned that too little progress will be made in reducing the number of deaths and serious injuries that plague our nation's highways each year.

Thank you for this opportunity to share our views.

Mr. STEARNS. I thank the gentleman.

Mr. O'Neill.

STATEMENT OF BRIAN O'NEILL

Mr. O'NEILL. Thank you, Mr. Chairman. I would like my full statement to be put in the record.

Mr. STEARNS. My unanimous consent, so ordered.

Mr. O'NEILL. My name is Brian O'Neill. I'm president of the Insurance Institute for Highway Safety. The Institute is a nonprofit research and communications organization that identifies ways to reduce motor vehicle crash deaths and injuries. I'm here today to discuss various approaches to improving vehicle safety.

For years after the Federal Government first began regulation motor vehicle safety, both auto makers and safety advocates accepted the premise that this was the only way that safety could be improved. Auto makers believed safety wouldn't sell and safety advocates believed that auto makers wouldn't try to sell safety, therefore it had to be mandated.

Today, however, times have changed. Safety does sell and many vehicle safety improvements have been made outside of the framework of Federal rulemaking. For example, we've already heard from Dr. Runge about side impact airbags that protect people's heads in side crashes. These are likely to become standard in most new passenger vehicles during the next few years. The widespread adoption of this impression safety technology has not been driven by government regulation, but by consumer demand for safety.

Consumer interest in the comparative vehicle safety ratings derived from crash tests conducted by both NHTSA and my institute have produced significant improvements. When we began testing cars in our frontal crash test program in 1995, few of them performed well enough to earn good ratings. Most were rated marginal or poor. In the last 2 years, a total of 44 of the 50 vehicles we tested were rated good and the other 6 were acceptable. None was rated as marginal or poor.

The Institute's new side impact test program already is prompting auto makers to improve designs to get good ratings in side impact crash tests.

As important as the marketplace competition is, however, it's not an appropriate or effective way to address all of the vehicle safety

issues. One example involves the recent concerns about the harm that SUVs and other light trucks can inflict on people in cars. So there continues to be a place for safety standards. But we don't believe that these standards always need to be federally mandated. We think this is especially the case when a timely response is needed to a particular problem. Voluntary cooperation among auto makers is another approach that recently has been used and the Institute has participated in some of these initiates. You've already heard about the initiative to reduce the risks in crashes between cars and light trucks. We think that the initiatives developed through this voluntary approach and already adopted and the future initiatives that will come from the research that we're undertaking will significantly improve the problems of compatibility in crashes between cars and light trucks.

Even though we can achieve improvements on a voluntary basis, Federal rulemaking does remain indispensable to establish a broad range of minimum levels of safety for all vehicles. A question, obviously, however, is who should establish NHTSA's rulemaking priorities?

Ideally, NHTSA should have both the commitment and the technical expertise to set priorities and complete the rulemaking process by issuing standards. We have to acknowledge that history is mixed in this regard. Few NHTSA Administrators have been knowledgeable about highway safety when they were appointed, so lags to accommodate learning frequently have slowed the agency's progress. Plus, the political leadership of NHTSA sometimes has been ideologically opposed to rulemaking which has further slowed progress toward vehicle safety improvements.

I believe that NHTSA's present Administrator, Jeff Runge is competent, knowledgeable and committed. Therefore, I believe extensive congressional dictates for new rulemaking are not needed. Any dictate should be confined to issues that have been outstanding for a long time and even then Congress should ensure that what it legislates necessary to undertake is feasible and based on sound science and adequate data.

Take the issue of roof strength. This issue has been around for a long time. The relevant standard is very old. it was first issued in 1971. And in response, this committee is now considering legislation from the Senate that would instruct NHTSA to consider setting new roof strength standards and I quote, "based on dynamic tests that realistically duplicate the actual forces transmitted to a passenger motor vehicle during an on-roof rollover crash." A laudable goal, but something that's not easy to accomplish.

The precise contribution of vehicle roof strengths to the deaths and injuries in rollover crashes is till not fully understood, in part, because FMVSS216, the roof strength standard specifies minimum performance levels and many, perhaps most auto makers are designing their vehicles so that the strengths of their roofs very significantly exceed this federally mandated minimum.

What this means is that we do not know how strong the roofs are on the current vehicle fleet. Because we do not know how strong roofs are today relative to the existing standard, it's very difficult to estimate the benefits of a new standard. That doesn't mean to say we shouldn't have a new standard or we shouldn't ad-

dress the issue, but the legislation mandates that there will be a dynamic test. The literature right now on dynamic testing for roll over suggests that making dynamic tests sufficiently repeatable, for them to be feasible as part of a Federal standard is not yet feasible.

These kinds of issues must be resolved before NHTSA can issue a rule requiring improved roof strength and particularly requiring improved roof strength using a dynamic test. So even though upgrading 216 is long overdue, Congress should not mandate a time table and certainly should not mandate an outcome, for example, a dynamic test that precludes NHTSA from conducting the research that is needed to produce the sound rule.

Vehicle safety today is being improved through regulation, consumer information and voluntary standards. This mix means that important vehicle safety improvements will be achieved much faster than when we relied solely on the regulatory process. Federal standards set minimum levels of safety, but in some areas, manufacturers are designing their vehicles substantially beyond these minimums to earn good ratings in consumer crash test programs.

Mr. STEARNS. Mr. O'Neill, I need you to sum up.

Mr. O'NEILL. Yes, I will, sir. Not every vehicle safety issue can be addressed this way, of course. It's hard to imagine consumers demand vehicles that are less aggressive or harmful to people in other vehicles. So we do need standards. Sometimes these can be voluntary standards and other times they should be federally mandated standards. But what we should be seeking is the appropriate mix of approaches so that we maximize vehicle safety.

[The prepared statement of Brian O'Neill follows:]

PREPARED STATEMENT OF BRIAN O'NEILL, PRESIDENT, INSURANCE INSTITUTE FOR HIGHWAY SAFETY

The Insurance Institute for Highway Safety is a nonprofit research and communications organization that identifies ways to reduce motor vehicle crash deaths, injuries, and property damage. I am the Institute's president, and I am here to discuss various approaches to improving vehicle safety. The first approach, beginning in the late 1960s, was to establish federal motor vehicle safety standards. Then in the 1980s, after the National Highway Traffic Safety Administration (NHTSA) began crash testing to provide consumers with comparative safety information, manufacturers responded by making improvements to get better crash test ratings. This also created a marketplace for safety, as car buyers began factoring the ratings into their purchasing decisions. More recently, automakers have responded to some well-publicized safety issues by cooperating among themselves to establish industry-wide safety standards.

IMPROVING VEHICLE SAFETY OUTSIDE THE FEDERAL RULEMAKING PROCESS

For years after the federal government began regulating motor vehicle safety, both automakers and safety advocates accepted the premise that this was the only way safety could be improved. The automakers believed safety wouldn't sell, and the advocates believed automakers wouldn't try to sell safety. Therefore, it had to be mandated.

In the 1960s-70s, auto companies employed few engineers working on safety, and this wasn't a good career path because safety wasn't a high priority in designing vehicles. But times have changed, and now the industry is very different. Auto companies employ lots of safety engineers and compete to equip vehicles with the latest safety technologies. Huge international companies exist, apart from the automakers, for the sole purpose of developing and selling vehicle safety technologies. Stockholm-based Autoliv, for example, operates in 29 countries and achieves sales of more than $4 billion annually.

Today it is clear that safety does sell, and many safety improvements have been made outside the framework of federal rulemaking. For example, side impact airbags that protect people's heads are likely to become standard in most new pas-

senger vehicles during the next few years. Recent research indicates these airbags reduce the risk of driver death in side impacts by about 45 percent. The widespread adoption of this impressive safety technology is not being driven by government regulation but by consumer demand for safety.

Consumer interest in the comparative vehicle safety ratings published by NHTSA and the Institute have produced significant improvements. A good example involves the front-end crashworthiness improvements that have been introduced in response to the Institute's offset crash test program. When we began testing cars in 1995, few of them performed well enough to earn good ratings. Most were rated marginal or poor. As consumers began paying attention to these and subsequent passenger vehicle ratings, automakers responded by improving frontal crashworthiness to provide better protection in serious frontal crashes. In 2002-03, a total of 44 of the 50 vehicles we tested were rated good, and the other 6 were acceptable. None was rated marginal or poor.

The Institute's new side impact test program already is prompting automakers to improve designs to get good ratings. In particular, plans to introduce side impact airbags with head protection have been accelerated because automakers know car buying choices will be influenced by the ratings produced by this program—and vehicles without side impact airbags will not get good ratings.

As important as marketplace competition is, it is not an appropriate or effective way to address all vehicle safety issues. An example involves the recent concerns about the harm that SUVs inflict on people in cars. So there continues to be a place for safety standards, though the standards do not necessarily have to be federally mandated. This is especially the case when a timely response is needed to a particular problem. Voluntary cooperation among auto manufacturers is another approach that recently has been used. The Institute has participated in two such initiatives, so I can offer some insights about the effectiveness of this approach. First it is important to recognize that NHTSA instigated both of the initiatives in which we recently participated—one to ensure that injury risks from inflating side impact airbags are negligible and the other to develop approaches to reducing incompatibilities in collisions between cars and light trucks. NHTSA prompted these efforts by challenging the auto manufacturers to respond quickly to issues that were generating public concerns. This is important because such cooperative initiatives should not be viewed as attempts to "go around" NHTSA or to circumvent federal rulemaking.

Addressing potential harm from inflating side impact airbags: In the wake of injuries and deaths to out-of-position occupants from inflating frontal airbags, then-NHTSA Administrator Ricardo Martinez challenged automakers in December 1998 to develop test procedures to ensure that the side impact airbags then being introduced would not have similar harmful side effects. The automakers asked Institute chief operating officer Adrian Lund to lead this collaborative effort, which included representatives of auto companies, restraint suppliers, government agencies, and safety research groups.

One year later the working group completed the primary phase of its work and presented test protocols for assessing out-of-position occupant injury risk, especially to children, from side impact airbags. All automakers now are designing side airbags to meet the voluntary standards established by the working group. The success of this collaborative effort is underscored by the fact that, while more and more vehicles are being equipped with side impact airbags, there have been no reports that they have caused serious injuries when they have inflated. And now that the automakers are testing their airbag designs using these protocols, NHTSA is taking a more active role by conducting its own tests to measure compliance. The agency also is providing consumer information about the agreements and which vehicles comply.

Addressing vehicle incompatibilities in crashes: In February 2003 major automakers responded to a challenge from NHTSA Administrator Jeffrey Runge to address problems caused by the design attributes of light trucks that can increase the risks for car occupants with whom the light trucks collide. The Institute and the Alliance of Automobile Manufacturers are leading this effort. To begin the process, experts from around the world presented the latest research on crash compatibility at a technical meeting convened in Washington, D.C. Then two groups of engineers and other technical experts from car companies and safety organizations began meeting on a weekly basis, one group addressing incompatibility in front-to-side impacts and the other addressing front-to-front crashes. Within a matter of months, the working groups had completed the first phase of their work, and all of the major automakers have agreed to adopt the performance and design requirements developed by these two groups.

The requirements addressing front-to-side crashes will improve occupant head protection in such collisions. In effect, by September 2009 auto manufacturers will

have to equip their vehicles with side impact airbags that protect the head. To address incompatibility in front-to-front crashes, participating automakers agreed that by September 2009 all of their new pickups and SUVs will have front-end energy-absorbing structures that overlap the federally mandated bumper zone for cars. This is a necessary first step toward reducing the chances of override and underride, thus enhancing the ability of the front ends of both vehicles to absorb crash energy and keep damage away from the occupant compartments. In effect, this particular agreement sets geometric design restrictions for the front ends of SUVs and pickups—something that would be harder and more complicated to achieve through the NHTSA rulemaking process because federal motor vehicle safety standards must specify performance, not design, requirements.

This is not the end of the collaborative effort. In fact, it is more like the beginning. The next phase calls for research that should lead to additional performance requirements addressing front-to-front crash compatibility. A series of barrier and vehicle-to-vehicle crash tests will be conducted to develop procedures to measure the distribution of crash forces across vehicles' front ends. This should lead, in turn, to requirements that will match front-end forces in head-on crashes between cars and light trucks. Similarly, research planned for side impacts is expected to lead to performance criteria for body regions in addition to the head as well as evaluations of advanced dummies for use in side impact testing.

It should not be assumed that achieving these kinds of voluntary standards is an easy process. Virtually every major automaker participated in the compatibility meetings, and there were frequent disagreements. Exchanges sometimes became contentious as we negotiated our way through the collaborative process. To achieve consensus we met frequently, conducted teleconferences, debated myriad options, and revisited thorny issues again and again.

We at the Institute signed on to this process knowing our credibility would be at stake if the outcomes of the collaboration turned out to be standards reflecting the lowest common denominators. So we were committed to making sure the process led to important safety improvements. I believe such improvements will happen, especially as the research phases of this initiative progress and we develop new knowledge about countermeasures to reduce crash incompatibilities.

ESTABLISHING RULEMAKING PRIORITIES

Even though we can achieve improvements on a voluntary basis, federal rulemaking remains indispensable to establish a broad range of minimum levels of safety for all vehicles. A question is, who should establish NHTSA's rulemaking priorities? Should it be Congress with help from safety advocates? Or should the agency set its own priorities? Ideally NHTSA should have both the commitment and the technical expertise to set priorities and complete the rulemaking process by issuing standards. But history is mixed in this regard. Few NHTSA administrators have been knowledgeable about highway safety when they were appointed, so lags to accommodate learning frequently have slowed the agency's progress. Plus the political leadership sometimes has been ideologically opposed to rulemaking, which has further slowed progress toward vehicle safety improvements.

A good example involves the rule for side impact protection. Federal Motor Vehicle Safety Standard (FMVSS) 214, first issued in 1970, was an adaptation of internal General Motors requirements for beams in car doors to resist intrusion. Somewhat later NHTSA conducted extensive research aimed at upgrading the standard to include crash testing with instrumented dummies. This research increased knowledge about vehicle performance in side impacts, but largely for political reasons NHTSA was not pursuing many new rules during the 1980s. Upgrading side impact requirements was put on hold. In November 1989 the newly appointed administrator, Jerry Curry, responded to what was by then strong political pressure to move forward with an upgrade, and he committed to do so early in his tenure. An upgraded rule was issued within a year of his arrival at NHTSA. Because of continuing technical controversy about the adequacy of the new side impact test dummy, Curry acknowledged when he issued the rule in October 1990 that it was not perfect. But adding that waiting for a perfect rule would only delay the timely establishment of a good rule, he said he expected the agency to pursue further upgrades as new research became available. Fourteen years later, NHTSA finally is close to proposing an upgrade to FMVSS 214 that will, in effect, require head protection. In the meantime, the Institute's side impact crashworthiness program and the voluntary agreement on front-to-side compatibility already are accelerating the installation of side airbags that protect people's heads. By the time any FMVSS 214 revisions can take effect, virtually all cars will afford such protection. So in this case marketplace demands and voluntary standards have superceded agency action.

As this example indicates, the rulemaking process has not always proceeded as expeditiously as it should. Sometimes this is because the agency's leadership has failed, and sometimes it is because Congress has changed the agency's own priorities. I believe NHTSA's present administrator, Jeff Runge, is competent, knowledgeable, and committed. Therefore, I believe extensive Congressional dictates for new rulemaking are not needed. Any dictates should be confined to issues that have been outstanding for a long time. And even then, Congress should ensure that what it legislates NHTSA to undertake is feasible and based on sound science and adequate data.

One longstanding issue is roof strength. The relevant standard (FMVSS 216) is essentially unchanged since it was issued in 1971, even though various groups have been advocating an upgrade for a long time. In response, this committee is considering legislation that would instruct NHTSA to consider setting new roof strength standards "based on dynamic tests that realistically duplicate the actual forces transmitted to a passenger motor vehicle during an on-roof rollover crash" and to consider requiring safety technologies and design improvements that would help to protect people in such crashes.

The Institute supports efforts to reduce the approximately 10,000 deaths and 20,000 serious injuries that occur each year in rollover crashes. But in the context of vehicle design changes intended to reduce this toll, it is important to remember that about 70 percent of the 10,000 annual deaths in rollovers involve unbelted occupants. The precise contribution of vehicle roof strength to the deaths and injuries in rollovers is not fully understood, in part because FMVSS 216 (like all federal safety standards) specifies minimum performance levels and many automakers are designing their vehicles so that the strength of their roofs significantly exceed the federally mandated minimum. Plus the

Institute's front and side crash test programs are producing stronger roofs on some vehicles. For example, the roof of the 2004 model Ford F-150 pickup truck is likely to be stronger than the roof on the 2001 model. This is because the current model's occupant compartment was strengthened to improve the pickup truck's performance in the Institute's 40 mph frontal offset crash test.

What this means is that we do not know how strong the roofs are in the current vehicle fleet. Because we do not know how strong roofs are today, relative to the existing standard, it is difficult to estimate the benefits of a new standard. Another issue involves the relationship between roof strength and real-world crash outcomes. As NHTSA has noted, "vehicles that perform well in roof crush tests do not appear to better protect occupants from more severe roof intrusion in real-world crashes." Yet another issue involves the difficulty in making dynamic tests sufficiently repeatable for them to be feasible as part of a federal standard. These issues must be resolved before NHTSA can issue a rule requiring dynamic tests. So even though upgrading FMVSS 216 may be long overdue, Congress should not mandate a timetable or an outcome (for example, a dynamic test) that precludes NHTSA from conducting the research that is needed to produce a sound rule.

CONCLUSION: VOLUNTARY AND REGULATORY APPROACHES COMPLEMENT EACH OTHER

Vehicle safety is being improved through regulation, consumer information, and voluntary standards. This mix should mean that important safety improvements will be achieved much faster than when we relied solely on the slow and deliberative regulatory process. Federal standards set minimum levels of safety, but in some areas the manufacturers are designing their vehicles substantially beyond these minimums to earn good ratings in consumer crash test programs. Not every vehicle safety issue can be addressed this way, of course. For example, it is hard to imagine consumers demanding vehicles that are less aggressive, or harmful, to people in other vehicles. So another alternative is needed, especially when changes need to be made quickly. Then the best approach may be for automakers to collaborate to set voluntary safety standards. The main reason the Institute has signed on to collaborative approaches is that sometimes they can offer a faster track toward improvements than federal rulemaking would allow.

Voluntary approaches do not replace rulemaking, which is and will continue to be a crucial NHTSA function. While the agency need not address every issue with a standard, it should have in place a long-term program to review and upgrade (or in some cases to eliminate) its rules. If the agency stays on such a course, there should be no need for Congressional dictates on rulemaking.

What is important to recognize is the range of options available today to achieve vehicle safety improvements. The wisest course is to proceed on a case-by-case basis, making full use of the most advantageous approach in any given situation.

Mr. STEARNS. I thank the gentleman.

Mr. Bonin.

STATEMENT OF JASON BONIN

Mr. BONIN. Mr. Chairman and members of the subcommittee, I am Jason Bonin, Vice President of Lighting Technology for Hella North America. I thank you for the opportunity to offer testimony before you today.

Hella North America is headquartered in Plymouth, Michigan. We maintain and operate manufacturing of lighting electronics in Flora, Illinois, Peachtree, Georgia, York, South Carolina. Hella employs 3,000 people in the United States and Mexico and is a U.S. subsidiary of Hella KG Hueck & Company of Lippstadt in Germany.

Hella is one of the world's leading manufacturers of automobile lighting and electronics and Hella North America is active in several automotive product trade associations, including the Motor and Equipment Manufacturing Association referred to as MEMA; the Transportation Safety Equipment Institution, TSEI; and the Motor Vehicle Lighting Council, MVLC, each of which supports the views expressed in my prepared testimony.

Hella welcomes the privilege to comment on the following issues which constitute fundamental and urgent matters to the U.S. automotive industry.

No. 1, the rewrite of the Federal motor vehicle safety standard FMVSS 108, the lighting reflective devices and associated equipment which sets forth the minimum safety performance standards applicable to all motor vehicles and automotive lighting equipment in the United States. And second, NHTSA's enforcement of FMVSS 108 with respect to imported noncompliant product.

Regarding the rewrite, Hella North America is very concerned about the status and current lack of priority being placed on NHTSA on the long-awaited rewrite of FMVSS 108. Standard 108 sets forth the minimum performance requirements for lighting and use in the United States and it's fair to say that more manufacturers are regulated by Standard 108 than any other standard. Indeed,the regulated and otherwise affected parties under this standard including manufacturers of all types of vehicles, producers of a broad range of lighting reflective products, component suppliers such as light source manufacturers, test equipment, laboratory entities and research organizations.

As one of the first standards issued by the agency more than 30 years ago, Standard 108 over the years has been amended frequently through a process that is essentially unplanned engraftment. Due to these piecemeal and fragmented amendments it is very difficult for all lighting equipment suppliers to find all provisions within and for the code and properly interpret and develop clear and consistent design compliance guidelines.

In addition, it's very difficult to be confident that all requirements are met for the products that are sold and used on the roads in the United States. It should come as no surprise, therefore, that NHTSA has issued more interpretations on this standard than any other standard. Once senior NHTSA official is on record describing this standard as incomprehensible.

The write of Standard 108 will have significant benefits for the agency by lowering the burden of issuing the large number of legal interpretations and also by simplifying the monitoring enforcing the standard. It has been several years since NHTSA first indicated that it would rewrite the Standard 108, however, agency staff indicated during a July 31, 2003 industry meeting and again during a November 11, 2003 meeting, that this project is not being given priority by NHTSA. These reports disappoint a very significant segment of the automotive parts industry.

To conclude on this point, Standard 108 is an important regulation, very much in need of an editing process that will give coherence to its meaning. The auto lighting technologies are moving very quickly and it is important to Hella and the lighting industry that the U.S. regulations continue to reflect the state-of-the-art in the necessary and advanced technologies and safety features in lighting on vehicles.

We seek your interest and support that we complete the rewrite of Standard 108 so that rulemaking to accomplish the safety enhancing result can be initiated as soon as possible.

The second issue that is very significant to the industry is one of noncompliant product entering the market. U.S. autoparts manufacturers are facing a growing tide of imports of motor vehicle products primarily in the lighting sector that do not meet U.S. Federal motor vehicle safety standards in 108, in particular. These imports unfairly compete against the products of legitimate U.S. manufacturers and more importantly poses serious and escalating risk to highway safety in the American public.

Many of these imported noncomplying lighting products, particularly taillights, red or amber in nature, are manufactured to precisely mirror or misrepresent by doing so legitimate products that comply and up to and including the placement of U.S. DOT and SAE markings on the product and I've brought a couple of those with me today.

Legitimate, U.S. manufacturers have invested millions of dollars in developing safe products while foreign manufacturers of unsafe, knock off products shirk their responsibility. Although it's viewed that China is the primary source, it is not the only one. And despite previous attempts to raise this issue with NHTSA, the auto parts industry has not received any assurance that the agency will devote the necessary resources to combat this growing problem.

The industry continues to engage in its own efforts to track and monitor such noncompliant products by, for example, conducting round robin testing, but we believe that these efforts must be combined with stronger detection and enforcement efforts by NHTSA and stiffer penalties for those found selling unsafe and noncompliant products.

NHTSA has successfully conducted a number of compliant-related investigations in this area. However, it's only a fraction of violations. NHTSA's standards enforcement arm for the agency's standard is understaffed and the agency appears to have relegated enforcement to the back burner. We seek help in your focus that NHTSA's attention on this important safety problem to assure both compliant American manufacturers are not unfairly forced out of

business and that we continue to provide safety product to the American public.

The U.S. automotive lighting industry estimates that sufficient monitoring and enforcement can achieve if NHTSA's Office of Vehicle Safety Compliance engages an additional two engineers to work exclusively on noncompliant product.

Hella would also like to publicly thank Congressman Fred Upton of Michigan and Congressman Dale Kildey of Michigan who have sought to assist the industry on noncompliant product issues and who have sent the letter as the House Auto Caucus Co-Chairs to Administrator Runge in February.

This concludes my testimony. I thank you for the opportunity to appear and give our voice for these very important and critical issues facing the lighting industry.

[The prepared statement of Jason Bonin follows:]

PREPARED STATEMENT OF JASON BONIN, VICE PRESIDENT, LIGHTING TECHNOLOGY, HELLA NORTH AMERICA, INC.

Mr. Chairman and members of the subcommittee, I am Jason Bonin, Vice President, Lighting Technology, Hella North America, Inc. My company is located in four states—Michigan, Illinois, South Carolina and Georgia and we are the US subsidiary of Hella KG Hueck & Co of Lippstadt, Germany. Hella is one of the world's leading manufacturers of automotive headlamps and electronics. We have been in the US since 1978. Hella North America is active in several automotive products trade associations, including the Motor and Equipment Manufacturers Association, the Transportation Safety Equipment Institute (TSEI) and the Motor Vehicle Lighting Council (MVLC)[1], each of which supports the views expressed in my prepared testimony. I am accompanied here today by outside counsel for the Motor and Equipment Manufacturers Association, Christopher Grigorian.

Thousands of automotive components manufacturers contribute to the daily lives of America's citizens. Without parts, component and systems suppliers, today's vehicles wouldn't be as safe, environmentally friendly, comfortable, high-tech or useful. Overall, the U.S. automotive supplier industry employs approximately two million workers with operations and facilities in nearly all 50 states. Sales in the U.S. automotive supplier industry totaled approximately $370 billion in 2002. The industry remains a primary supporter of small manufacturers in the United States with each average Tier One (selling direct to a motor vehicle manufacturer) original equipment supplier representing a base of 1,300 lower-tier suppliers and parts manufacturers.

Hella welcomes the privilege and opportunity to comment on the following issues, which constitute fundamental and urgent matters to the US automotive industry:Q02

1. The rewrite of Federal Motor Vehicle Safety Standard (FMVSS) No. 108, "*Lighting, reflective devices, and associated equipment*," which sets forth minimum safety performance standards applicable to all motor vehicles and automotive lighting equipment in the United States.
2. NHTSA's enforcement of FMVSS 108 in respect of imported non-compliant product.

[1] Founded in 1904, the Motor & Equipment Manufacturers Association (MEMA) exclusively represents and serves manufacturers of motor vehicle components, tools and equipment, automotive chemicals and related products used in the production, repair and maintenance of all classes of motor vehicles. MEMA represents more than 700 member and affiliated companies. TSEI, a product line group of MEMA, is a non-profit trade association representing North American manufacturers of vehicle safety equipment, including rearview mirrors, supplemental information devices, headlighting and signal lighting products, reflex reflectors, retroreflective conspicuity tape, emergency warning triangles, emergency lighting and other safety equipment for truck, trailer, passenger, emergency service and related vehicles. The MVLC, consisting of the automotive industry's leading lighting companies, was created to study, assess and build consensus on real world automotive lighting issues that will meet the common needs of motorists, pedestrians, government and industry. The MVLC is a product line group of MEMA.

FMVSS 108 REWRITE

Hella North America is very concerned about the status and lack of priority being placed by NHTSA on the long-awaited rewrite of FMVSS 108.

Standard 108 sets forth safety performance standards for all automotive lighting in use in the United States. It is fair to say that more manufacturers are regulated by FMVSS 108 than any other FMVSS. Indeed, the regulated or otherwise affected parties under FMVSS 108 include manufacturers of all types of motor vehicles, producers of a broad range of lighting and reflective products, component suppliers such as light source manufacturers, test equipment and laboratory entities, and research organizations.

One of the first standards issued by the agency more than 30 years ago, Standard 108 over the years has been amended frequently through a process that can fairly be characterized as unplanned engraftment. As a result of these piecemeal amendments, Standard 108 has become extremely difficult to understand and interpret. It should come as no surprise, therefore, that NHTSA has issued more interpretations of this Standard than any other standard. Due to the current ambiguous and arbitrary organization of the current document, it is very difficult for all lighting equipment suppliers to properly interpret and develop clear and consistent design compliance guidelines for their products that are to be sold in the United States market. There have also been many updates in the SAE standards referenced in the regulation that are critical and pertinent to the rewrite of the FMVSS 108 document. One senior NHTSA official is on record describing this standard as “incomprehensible.”

It has been several years since NHTSA first indicated that it would rewrite FMVSS 108 to make it more understandable. However, agency staff indicated during a July 31, 2003 industry meeting, and again during a November 11, 2003 meeting, that this project was not being given priority or even current attention by NHTSA. These reports were extremely disappointing to a very significant segment of the industry. Based on our understanding, the proposed rewrite of FMVSS 108 promises to be significantly more understandable and organized for information referencing and retrieval.

The rewrite of FMVSS 108 will also have significant collateral benefits to the agency. It will likely reduce the significant burden upon the agency of issuing large numbers of legal interpretations, and also simplify the agency’s job of monitoring and enforcing the standard.

To conclude on this point, FMVSS 108 is an important regulation very much in need of an ordering and editing process that will give coherence to its meaning and wide ranging applications. Vehicle lighting technologies are moving very quickly and it is important to Hella and the lighting industry that US regulations continue to reflect the state-of-the-art in vehicle lighting systems. We seek your interest in and support of the 108 re-write process so that rulemaking to accomplish this safety-enhancing result can be initiated as soon as possible. It is only through understanding and consistent application of this standard that lighting safety will be insured.

NON-COMPLIANT IMPORTED PRODUCT

The second issue I would like to address is the problem of importation of non-compliant lighting products into the United States.

U.S. auto parts manufacturers are facing a growing tide of imports of motor vehicle products, primarily in the lighting sector, that do not meet U.S. Federal Motor Vehicle Safety Standards, and FMVSS 108 in particular. These imports unfairly compete against the products of legitimate U.S. manufacturers and, more importantly, pose a serious and escalating risk to highway safety and to the American public. While this problem is prevalent across the entire array of automotive components, it has been particularly significant in the automotive lighting product sector, affecting North American manufacturers of vehicle safety equipment, including head lighting and signal lighting products, emergency warning triangles and other safety equipment for truck, trailer, passenger, emergency service and related vehicles.

Many of these imported non-compliant lighting products (particularly taillights, red and amber lights) are manufactured to precisely mirror legitimate products that comply with FMVSS, up to and including the placement of “USDOT” and “SAE” markings on the non-compliant products. Legitimate U.S. manufacturers have invested millions of dollars in developing safe products, while foreign manufacturers of unsafe, “knock-off” products shirk this responsibility. China is the primary source of non-compliant motor vehicle lighting products being sent into the U.S. market, but it is not the only source. Once manufactured in an overseas plant, the products are subsequently imported into the country without their packaging and then packaged and labeled in the United States before being sold.

Certain U.S. manufacturers have sought redress under NHTSA regulations to address this problem, and have obtained positive results in a few cases. We believe that these efforts must be combined with stronger detection and enforcement efforts by NHTSA and stiffer penalties for those found selling unsafe and non-compliant products.

Despite previous attempts to raise the prominence and visibility of this issue within NHTSA, the industry has not received any assurances that the agency will devote the necessary resources and staff to combat this growing problem. Although NHTSA has conducted a number of compliance-related investigations in this area since 1999 (15 involving replacement visibility and signaling devices that were imported from overseas markets), these cases represent a small fraction of all of the existing product violations. One such case, completed in June 2003, resulted in a $650,000 civil penalty for the American Products Company (APC). APC was found guilty of manufacturing, certifying and selling replacement lamps that were noncompliant. According to NHTSA's May 16, 2003 press release, APC had for several years sold various models of noncomplying replacement tail lamps, known as "clear" tail lamps or "Eurotail" lamps. In some cases, the non-complying models replaced red lamps and reflectors with clear ones. In other cases, there were missing side marker lamps or reflectors. APC also sold other noncompliant replacement lighting equipment, including clear corner and bumper lenses and high-intensity discharge (HID) conversion kits. This equipment was sold by a variety of retailers, and had been the subject of four recalls covering thousands of parts. This represents a successful case, but it is only one in a veritable ocean of thousands of similar violations.

The industry has been engaged in its own efforts to track and monitor such noncompliant products by, for example, conducting round-robin testing, but the industry's efforts must be supplemented by NHTSA's enforcement muscle. However, NHTSA's standards enforcement arm for the agency's lighting safety standard is understaffed and, more importantly, the agency appears to have relegated enforcement in this important area of vehicular visibility and signaling to a "back burner." As a consequence, an important segment of American industry—comprised of companies such as Hella North America who have committed the necessary product costs to assure compliance with the NHTSA lighting standard and improved consumer safety—is being overwhelmed and undermined by offshore competitors that seek only to earn a quick buck at the expense of the safety of the American consumer.

Please understand that Hella and other U.S. manufacturers welcome competition from any company, domestic or foreign, that complies with the U.S. laws applicable to all automotive lighting competitors doing business in this country. That, obviously, is a driving force and great strength of our free enterprise economy. But compliance with NHTSA safety standards comes at a price that many offshore competitors and their importers are unwilling to pay. These companies enjoy the benefit of the American market without the burden of its laws.

We seek your help and intervention to focus NHTSA's attention on this important safety problem to assure both that compliant American manufacturers are not unfairly forced out of business by unscrupulous competitors who consistently operate well outside the law, and that the safety of the American motoring public is preserved.

The solution to this long-standing problem is simple: NHTSA should dedicate additional resources to investigating and prosecuting offending manufacturers and importers. As we understand it, only two individuals within NHTSA are presently directed to this function, namely one full-time engineer and a direct supervisor. The United States automotive lighting trade associations—the Transportation Safety Equipment Institute and the Motor Vehicle Lighting Council—have estimated that sufficient monitoring and enforcement can be achieved if NHTSA's Office of Vehicle Safety Compliance engages two additional staff engineers to work exclusively in the area of noncompliant products. The Associations estimate that this investment in additional personnel would cost less than $200,000 annually, including overhead and administrative expenses. We believe this is a small price to pay to reduce the serious commercial losses to U.S. businesses and the safety hazards on the nation's highways that are caused by these practices. Thank you for the opportunity to appear and give our voice for these important issues facing the lighting industry in the US.

Mr. STEARNS. I thank the gentleman and I have the prerogative. I'll start with my questions.

Mr. Strassberger, your Alliance of Auto Manufacturers, I guess everybody except Honda, is that correct, pretty much, who is not in your alliance, I'm just curious?

Mr. STRASSBERGER. The most notable exceptions are Honda and Nissan.

Mr. STEARNS. Nissan, okay. Well, you've heard NHTSA Chairman speak and you know about the McCain bill and that we have the ability to reauthorize NHTSA as a clean bill or we could adopt some of the mandates that have been suggested by Mr. Pittle who supports the McCain bill and you folks don't support it.

Now it sounds like Mr. O'Neill, you do not support the mandates in the McCain bill, that's correct.

And Mr. Bonin, you support the McCain bill mandates, part of the NHTSA reauthorization, just yes or no?

Mr. BONIN. Yes.

Mr. STEARNS. And Mr. Shea, no.

Mr. SHEA. No, we do not.

Mr. STEARNS. So that's where we seem to settle here and as Mr. Barton, our Chairman, new Chairman, has talked about, we're trying to wrestle ourselves with the reauthorization of a clean bill or not or just to let the process work and so I think it's incumbent, Mr. Strassberger, for you to tell me these voluntary standards that were developed, I guess you and Mr. O'Neill's group, what will that cost you and then give me if the Senate bill is passed, what would it cost you and what would be in terms of quantity, quantify it rather, so that I can get an idea in terms of impact this is going to have on the automobile manufacturers, the way they're moving now and in effect, that the bill that Senator McCain has is implemented? Just a short amount of time, it's a big question.

Mr. STRASSBERGER. Sure. In our collective deliberations, we did not talk about cost. We did not consider cost. I am sure that that was a concern or a point of analysis that was undertaken by each of the individual manufacturers when they considered whether or not to opt into this program. Needless to say, the cost will be in the billions and the cost of the McCain legislation, the Senate legislation, would also be in the billions, but it would be a cost that we can't afford to do twice. And so if that piece of legislation were to pass, it's quite likely that a lot of our voluntary efforts would have to cease as we wait for NHTSA to promulgate rules so that we would know what we would have to do under those new rules.

Mr. STEARNS. Could you make the argument that if you saw the possibility of that bill passing, that you would stop what you're doing now?

Mr. STRASSBERGER. Absolutely, yes.

Mr. STEARNS. Okay. And then if you stopped it, would that delay possibly you doing any more initiatives that might work toward safety?

Mr. STRASSBERGER. It would absolutely stall any other voluntary efforts that we have on-going right now. It would solve the industry's——

Mr. STEARNS. Mr. O'Neill, any other comments you want to make and then I'm going to ask Mr. Pittle.

Mr. O'NEILL. Well, when it comes to the compatibility initiative and costs, obviously, one of the things that this initiative will drive

is the installation of side impact airbags with head protection. There's a cost associated with that technology, but that technology will save a lot of lives.

Front to front design changes involve changing the front end architecture of a number of light trucks and SUVs. The cost of that will be significant, but it will not be as great as it need be if it was an accelerated approach because it can be done during the normal redesign cycle.

I think the concern we have with mandates is not so much that Congress is mandating certain kinds of rules, it's the fact that they're dictating outcomes and deadlines.

Mr. STEARNS. Okay.

Mr. O'NEILL. I don't think that's appropriate.

Mr. STEARNS. Now, Mr. Pittle, your job is to convince the American public that these mandates and even Mr. Runge pointed out that are not viable, not based upon good science, your job is to convince the American public that all these manufacturers should implement these mandates, so the floor is yours.

Mr. PITTLE. Take it away. First, I need to let you in on an almost forgotten secret. From 1973 to 1982, I served as Commissioner of the Consumer Product Safety Commission, so I know firsthand during those years the complicated interaction between cost and benefits of risks and hazards, the role of personal behavior, the use of voluntary standards, mandatory standards, information programs, etcetera.

Mr. STEARNS. Are you saying you believe mandatory works better?

Mr. PITTLE. I'm saying——

Mr. STEARNS. Congressional mandates?

Mr. PITTLE. I would agree with my colleague here that there's a mix and there's a time for mandatory and there's a time for voluntary——

Mr. STEARNS. There's a proper blend.

Mr. PITTLE. There's a proper blend. But I must say that the administration has, in my view, mischaracterized the bill that you see before you. There are not mandates for technology. Every one of these provisions except for changing the 8 second time for the seat belt reminded which I hope is not controversial, all the other provisions in there asked for performance results to reduce complete or partial occupant ejection shall consider ejection mitigation capabilities, shall upgrade to reduce occupant ejection. I mean I can just go down the list. And the reason I say that is because it's to be analyzing back over prevention technology——

Mr. STEARNS. So you're saying it's feasible to implement this and you don't agree with——

Mr. PITTLE. What this really does is to put the issue on their agenda and by the way, Dr. Runge sat here and said here are our priority areas, rollover and side impact—well, that's what this is dealing with. It's dealing with the complex issues of rollover and side impact injuries and that is the bulk of these issues.

And I must say that the question about whether or not it's a mandated deadline, yes, there are deadlines in there. You need a deadline, but NHTSA can always come back to Congress and ask for more time. They do this all the time. It could terminate the

rulemaking like it did in 1994 to a congressional mandate and it can adjust the deadline. This is not an attempt, remember, we want an outcome from NHTSA that gets all these things done in a cost-effective technologically sound basis because if they aren't technologically sound, they'll be stopped. Somebody will take them to Court. I wouldn't want that. That's not the desired outcome. The desired outcome is to get these issues on their agenda so that 4 or 5 years from now when Dr. Runge may not be the Administrator and who knows who will be in there, that the staff is working on a congressional mandate, not on something that was done for today and may change tomorrow.

Mr. STEARNS. My time has expired. The gentlelady, ranking member.

Ms. SCHAKOWSKY. Thank you. Mr. O'Neill, do you represent the insurance industry?

Mr. O'NEILL. I don't represent the insurance industry, but we are funded entirely by the automobile insurers.

Ms. SCHAKOWSKY. Because Allstate Insurance and State Farm Insurance were in my office I guess it was yesterday, along with representatives of all the consumer organizations, all of whom support the Senate bill, in support of the legislation, so you're clearly taking a different position from Allstate and State Farm?

Mr. O'NEILL. We're taking a position based on data and research that many of these mandates——

Ms. SCHAKOWSKY. But you don't poll your members, I'm trying to understand.

Mr. O'NEILL. We do not poll our members, no.

Ms. SCHAKOWSKY. I see. Dr. Pittle is really the only person here among all those who have testified who has made the case for the mandates. I want to give you more time to talk, to make that case and to talk about whatever you want.

Mr. PITTLE. Well, that's really nice, thank you. I appreciate that. I was prepared for something else. I'd like to point out that this is not a new issue in which somebody has dreamed up a cockamamie fix. Rollover has been on everybody's mind now since at least 1973 when NHTSA came up and announced in the Federal Register they were going to work on it. And here it is 31 years later and it is still a growing problem. So it is our view that by putting a rollover resistance and a rollover crashworthy standard on their agenda, that they will—and by the way, it is already on their agenda. They said it's one of their top priority items. So by having it on their agenda and a congressional mandate, we've seen over the years that NHTSA responds better to direction from Congress than when it sets its own direction.

Ms. SCHAKOWSKY. This is the view of all of the consumer, the organizations that represent consumer interest.

Mr. PITTLE. It is Consumers Union's view and I'm sure it's the view of colleagues that I've spoken with as well as others. The use of a mandatory standard is appropriate when, and a congressional direction is appropriate when the agenda is not getting to it in a timely way and I think 31 years is what I would call not in a timely way.

When I was at the CPSC there were times when Congress gave us mandates and it basically directed us to solve a problem that

they saw and that we were not considering that important and I would take the direction from Congress and I consider Congress is speaking for the people and I consider that to be an appropriate way. You oversee this Agency. You oversee all these Federal safety agencies and it is your mandate that they follow it as your legislation that they're trying to enact and I'm trying to convince you that they aren't following that mandate in a timely and effective way.

That's our position.

Ms. SCHAKOWSKY. You have in your testimony on the issue of windows, the window safety, that Dr. Runge had said that this was a problem that would just take care of itself or would just go away. Could you comment on the issue of safety power windows?

Mr. PITTLE. I must say I'm really surprised by how that has stuck in the marketplace. Many manufacturers have a decade ago stop using these dangerous switches and several manufacturers, we rate cars every year and we just bought 50 some odd brand new 2004 models and several of them had these unsafe switches. So manufacturers are still using them. There's no design benefit, there's no cost benefit. It sort of makes me scratch my head why they would continue to families at risk and have some child be strangled to death by a window that goes up and closes on their neck.

So in our asking and having a provision in here that that be resolved by a standard, that's a standard that NHTSA's been considering for a number of years and it just hasn't been finished. So this isn't going to take a lot of research. It's not going to take a lot of heavy insight and research on the part of the agency staff. This is something that needs to be just completed. I would think of this as—I would hope that this would be like an automatic. I don't understand why the agency's leader would say I'm going to let this take care of itself. It hasn't taken care of itself, even though kids have been strangled by this.

Ms. SCHAKOWSKY. How do you respond to the issue of the cost to the industry? Clearly, we're interested in saving lives, but we are also interested in——

Mr. PITTLE. I absolutely agree, so I'm going to go back to my former regulator's mindset. There's no standard that's ever going to get on the books that doesn't pass a cost benefit muster and the standards that NHTSA has issued recently have passed a cost benefit muster and it would never be able to implement something in the future that didn't have a reasonable cost for the benefits that are acquired.

But the fact of the matter is when we're talking about billions to the industry, the American public and society is absorbing a $260 billion cost each year from these injuries. So I know that there is a tradeoff here and I know everything won't happen instantly, but we do need to get the agency's attention to make these a higher priority item and that it will stick there long after Dr. Runge is—hopefully, he stays there a long time, but when he's gone.

Mr. STEARNS. Mr. Bass.

Mr. BASS. Thank you, Mr. Chairman. Dr. Pittle, my family and I have been subscribers to Consumer Reports for years and years.

I don't think I'd ever buy anything without looking at that magazine.

Mr. PITTLE. Thank you. Neither would I.

Mr. BASS. And I love some of the—I won't go into it, but it's just a great magazine. And I'm maintaining an open mind about the issue of accepting the Senate version of NHTSA's reauthorization.

It seems to me that if you really want to make cars safe, you ought—what about some of the more draconian changes, like limiting a car's speed or requiring helmets, that kind of thing? Do you have any comments on those kinds of—it would really change the safety.

Mr. PITTLE. You mean helmets to car occupants?

Mr. BASS. Yes.

Mr. PITTLE. Well, Consumer Reports doesn't dictate what consumers buy. It just gives them information and our whole purpose is to make sure that they have objective and complete information so they can make that choice rationally. Consumers can't make a choice rationally about how a vehicle will handle in an emergency. You can't walk into a showroom and see. You could now on those models that offer electronic stability control, our advice is that that's a desirable feature and you should buy it, but on our test track they're not all alike, just like washing machines and refrigerators aren't all alike. Some of them work far better than others. So we have a provision—there's a provision in this S. 1072 that would have NHTSA evaluate electronic stability control so that consumers would know which ones work better. Some of them may be actually more preferable than others. Some of them may not do as good a job. So all of this comes down to the consumer making a choice and the consumer having to make a choice on information they can rely on and trust. I expect that information to come from an agency—NHTSA is the only agency that stands between the consumer and an unsafe vehicle. They're the ones that we rely on. They're the ones that Congress gave us as the overseer of the marketplace with respect to safety and I would expect them to—I would like for them to take on those challenges.

Mr. BASS. Does Consumers Union oppose a mandatory helmet law for automobile occupants?

Mr. PITTLE. I think we would probably question it as questionable.

Mr. BASS. You don't think it would improve safety?

Mr. PITTLE. I don't think so, no.

Mr. BASS. How about limiting speed? I see here, safety belts, alcohol speed, road conditions are the four factors that contribute to fatalities.

Mr. PITTLE. Those are the factors that contribute to an accident, but when it contributes to a fatality it has something to do with whether or not if the vehicle rolls over because of the way it's designed, its suspension, its tires, etcetera and its center of gravity height. If it rolls over, that's not listed on there. That has to do with the automobile designer's decision about how they're going to market the car and how they're going to design it. So it does affect whether or not it rolls over. Then you have to decide once you're rolling over, are you in an environment in which you're protected?

Will the roof crush in? Will the windshield go out and you go out there? Will the seat belt retain you?

I mean another one of the provisions in here is to have seat belts with pretensioners. That's a very important thing in a rollover because seat belts don't always hold people in a rollover and they can slip out of them or they're partially ejected which is actually too gruesome to describe.

Mr. BASS. I yield back, Mr. Chairman.

Mr. STEARNS. Thank the gentleman. Distinguished Ranking Member Dingell.

Mr. DINGELL. Mr. Chairman, thank you for your courtesy.

Dr. Pittle, I've been reading the legislation from the Senate and if I read it correctly it would require a series of agency actions. First of all, three agency actions would have to be completed within 1 year of enactment. One would have to be completed 2 years after enactment. Four agency actions in 2005. Eight agency actions in 2006. Eight agency actions to be completed in 207. One rule or agency action to be completed in 2008. Now I haven't totaled that up, but that's a substantial number of agency actions that would have to be taken.

Am I correct in that?

Mr. PITTLE. I'm going to——

Mr. DINGELL. Yes or no?

Mr. PITTLE. I don't know, but I'll say yes.

Mr. DINGELL. Now your agency or Consumers Union suggested that there should be a significantly larger number of agency actions completed, did you not?

Mr. PITTLE. No, these are the ones that we support here.

Mr. DINGELL. Didn't you suggest a number of additional other changes that you supported?

Mr. PITTLE. I'm sorry, no, other than what's in S. 1072.

Mr. DINGELL. Now, gentlemen, do you agree with what I've said? To the other members of the panel, all agree? Does anybody there disagree?

All right, I note then and this raises to my mind a very interesting question. Perhaps Mr. Strassberger, you could tell us how many of these agency actions would require a major or full redesign of a vehicle?

Mr. STRASSBERGER. Quite a few of them would.

Mr. DINGELL. How many?

Mr. STRASSBERGER. Off the top of my head, I'm going to say of the 10 or so rulemakings that we believe the Act calls for, probably at least half if not more.

Mr. DINGELL. Now these rulemakings would come at different times so the manufacturer would be compelled then to redesign vehicles according to congressional whim, is that not right?

Mr. STRASSBERGER. They would come at different times, they would overlap.

Mr. DINGELL. What would that do to the cost of manufacturing vehicles?

Mr. STRASSBERGER. I'm sorry?

Mr. DINGELL. What would that do to the consumer cost for manufacturing vehicles?

Mr. STRASSBERGER. We have not had a chance to evaluate that, however, I have gone back to take a look at the cost that was added to vehicles by the rulemakings that the agency has issued over the course of the last decade or so. Many of those in response to prior reauthorizations and that cost is between $700 and $1000 a vehicle in 2003 dollars.

Mr. DINGELL. In my experience, I went by an auto plant to look at a new car which was being put on the market. I asked the CEO of the company, I asked how much does putting this car on the market cost the company that you have to retrieve in sales costs from consumers? He said—and this was a small car, it was not a large car or van. He said $9 billion. This was some years ago, so I'm sure it costs more. Is that a fair estimate of what it costs to redesign or reproduce a vehicle?

Mr. STRASSBERGER. Well, those estimates, I think, vary to the redesign.

Mr. DINGELL. Is it unrealistic?

Mr. STRASSBERGER. In some instances, probably not.

Mr. DINGELL. All right, Mr. O'Neill, there's a problem, I think, which we have not addressed for a long time and you're referring to it and I'm referring to roof strength which is a component of the safety questions on rollovers.

Do we really need and just yes or no because this is not a trick question. Do we need a dynamic test for the safety and strength of the roof?

Mr. O'NEILL. Ideally, we do, but today we don't know how to do one.

Mr. DINGELL. That's one of the problems that we confront. I happen to think we do need a test, but nobody knows how to design that test, is that right?

Mr. O'NEILL. Right now, the literature on dynamic testing is such that it would not be feasible to produce a test that is sufficiently repeatable to become a standard. You can do dynamic rollover tests, but making them repeatable enough for them to be part of a standard is not yet there.

Mr. DINGELL. Now, Mr. Strassberger, what do you have to say about this matter of repeatability and about making these tests? I've not gotten the exact number of tests or agency actions or redesigns that would be needed, but how would we assure that all of these tests or all of these agency actions would assure that there be a repeatable test or a design change which would be beneficial?

Mr. STRASSBERGER. I think that begins first with the collection of data that would quantify the safety problem, a better understanding of how people are being injured in crashes, identifying potential counter measures or potential changes in the vehicle design and then developing tests that drive engineers to make those changes in vehicles and that is the real issue then with tests that are not repeatable. if they give engineers multiple answers to the same question, they don't know how to——

Mr. DINGELL. You don't know what answer you're getting. It's the same as no answer.

Mr. STRASSBERGER. That's exactly right.

Mr. DINGELL. Yes, isn't that right?

Mr. STRASSBERGER. That's exactly right and then you don't know whether or not indeed you've done any good in the real world.

Mr. DINGELL. And you may have spent a lot of money to accomplish nothing?

Mr. STRASSBERGER. That is the problem that we face, exactly.

Mr. DINGELL. Can you tell us what the cost of all these redesigns would be?

Mr. STRASSBERGER. As I mentioned previously in the Senate bill we have not evaluated that.

Mr. DINGELL. Is there any way of figuring out what those costs would be to the consumer?

Mr. STRASSBERGER. In time, yes, I expect so.

Mr. DINGELL. What would they be? What this tells me is you're telling me this is going to cost consumers more money. With occasion conjectural judgments as to benefits to be achieved. Is that right?

Mr. STRASSBERGER. Exactly.

Mr. DINGELL. Mr. O'Neill, do you have a comment on that?

Mr. O'NEILL. I think vehicle safety improvements are important. They are needed. I think there are many ways to achieve them. I think that rulemaking, I mean legislation that presupposes we know all the answers is not the way to address the problem.

Mr. DINGELL. Mr. Chairman, I have used more time than I'm allowed. I thank you for your courtesy.

Mr. STEARNS. Thank you. The gentleman from Texas, Mr. Green?

Mr. GREEN. Thank you, Mr. Chairman. This question is for any of the industry panelists. The auto industry has developed some impressive technology on the safety end. However, it's my understanding that most of the technology safety features are only available on the higher end vehicles and I assume that's related to the price. First, what would the industry's costs be to put the most advanced safety technologies on all the models and does the industry have a time line for applying some of these to all the models and I just want to share that somewhere along the way because I have a District that's not a wealthy area and even though they'd like to buy the high end models they typically do buy the moderate. Is there a decision the industry does for that?

Mr. O'NEILL. I'll take one stab at that, Mr. Green. Typically, new technology will be introduced at the high end of the market because those vehicles are less price sensitive, but as that technology becomes more mature, costs drop and we expect and hope to see that technology spread into the less expensive vehicles.

Right now, electronic stability control systems, which we have look quite promising as accident avoidance technology, are typically available on the more expensive vehicles. I think that that technology will become less and less expensive and you'll see it spread to less expensive vehicles. Same thing with side impact airbags that protect heads. That is going to spread to inexpensive vehicles very rapidly because the cost as the ramp up of production of these technologies increases drops dramatically. But typically, technology, new technology will start in the segments of the marketplace that are less price sensitive.

Mr. GREEN. Let me add a caveat to that and for the other answers too, can you tell me a safety feature that started at the high

end and ended up in all cars—just off the top of your head, if not, you can get back with us.

Mr. O'NEILL. Well, airbags before they were mandated started in Mercedes, the second generation of airbags were available in Mercedes Benz products before they were mandated, for example. Now they're in all products. We're going to see the same thing, not through a mandate, at least not in the near future, we're going to see the same thing with side impact airbags. They're going to be in all products.

Mr. GREEN. Okay. Mr. Strassberger?

Mr. STRASSBERGER. There are other technologies as well. Antilock brakes is yet another example. And in fact, my written testimony I provide a long list of safety features that manufacturers have introduced in vehicles voluntarily, absent of regulation. All of those started, it makes sense even from an engineering perspective to roll out technology in orderly fashion and all of those technologies are spreading through the broad range of vehicles that are offered. So it's really just a way, I think, of managing the roll out of a technology in a way that's most appropriate.

Mr. GREEN. But it does start at the high end and do you have any examples from the list, and again, without looking at your testimony, that started at the high end and then went to the more moderate cost or lower cost automobiles?

Mr. STRASSBERGER. Brian is right, ABS, airbags, side airbags, electronic stability control, an emerging technology that we're seeing is so called dynamic head restraints that help protect occupants and their necks in rear crashes. So there are a number of examples, I think.

Mr. GREEN. Is that available today in the higher end?

Mr. STRASSBERGER. Yes, it is.

Mr. GREEN. Anyone else? Mr. Pittle, please, if you have a response to that?

Mr. PITTLE. I thought you were precluding me when you say you wanted the industry to respond.

Mr. GREEN. I wanted to hear from them first, but obviously, you're on the panel.

Mr. PITTLE. I understand. I agree with what they're saying, that we see them coming in at the higher end. I think that there's a difference between a safety feature and a safe design, so when we talk about roof crush, that, I think is something that affects everybody who gets in a rollover and I would—that's why we think a standard on that would be so important because it will affect whoever and whatever car you're in. And having the other devices, when they do trickle down and they get more in, consumers get the benefit of that. But something like roof crush, something like side impact protection, we believe those things should be across the board, otherwise, it winds up to be that the poor wind up paying more.

Mr. GREEN. Thank you.

Mr. STEARNS. Well, I don't think there's anyone else here. We're not going to go a second round unless—I don't have any more questions and neither does the gentlelady, the ranking member. Is there any—something that's pressing on anyone of you that—Mr. Bonin, that you had the least amount of questions, is there some-

thing that you would like to reiterate here before we close up the subcommittee?

Mr. BONIN. I would just like to clarify that the auto parts industry, as a whole, typically has not taken a position——

Mr. STEARNS. So you have no position on McCain?

Mr. BONIN. Right.

Mr. STEARNS. Okay.

Mr. BONIN. It is, however, important that we—there are practical matters and day to day manufacturing of safety devices and the laws that we currently operate under have had significant delays because of resources afforded to Mr. Runge and the Administration and we look for Congress' continued support for that administration and in the appropriate way to guide their priorities.

Mr. STEARNS. Well——

Mr. PITTLE. I was just going to say that in the last discussion about the rollover roof crush, I'd like to submit, if I could, to the record five papers that I've just recently acquired. The title of the first one is "Repeatable Dynamic Roll Over Roof Test Fixture" and this group of papers deals with the repeatability of and the research that's going on on rollover——

Mr. STEARNS. By unanimous consent, so ordered. All five of them.

Mr. PITTLE. And one last point, the argument that all of this is a bunch of—NHTSA is in a position to coordinate when these standards go into place and Congress is in position to negotiate these dates. These are—this is the Senate, so it can be negotiated so that it doesn't bunch up, but whatever it is, it's dealt with in a coordinated manner.

Mr. STEARNS. Mr. Shea, anything you'd like to——

Mr. SHEA. I would just like to echo Congressman Dingell's remark about compliance. The TREAD Act rulemakings for the tire industry changed the entire paradigm for industry and we think it's only fair to make sure that everyone complies with these new regulations. It's good for the consumer and it certainly will make us all adhere to the law.

Mr. STEARNS. Okay, and NHTSA has someone in the audience, Mr. Scott Brenner. Thank you for staying over to listen to the second panel so that anything they said that you've heard and you can take back to your boss.

So with that, I thank all of you for your patience and the subcommittee is adjourned.

[Whereupon, at 12:26 p.m., the hearing was concluded.]

[Additional material submitted for the record follows:]

PREPARED STATEMENT OF JACQUELINE S. GILLAN, VICE PRESIDENT, ADVOCATES FOR HIGHWAY AND AUTO SAFETY

Every day millions of American families leave their homes to travel by car to work, school, medical appointments, soccer practice, shopping malls and cultural activities. Although our nation's highway system has created mobility opportunities that are the envy of the world, it has also resulted in a morbidity and mortality toll that is not. The U.S. Department of Transportation's (DOT) accounting of the traffic fatalities for 2002 is grim.

In 2002, there were 42,815 motor vehicle fatalities, the highest number in over a decade. A record 10,666 fatalities occurred in rollover crashes. In addition to the emotional toll, these deaths are associated with a large financial toll to society. DOT estimates the cost of motor vehicle crashes exceeds $230 billion annually. Without

a major reversal in the growing number of highway fatalities and injuries in the next six years, almost 250,000 people will die and 18 million more will be injured at a societal cost of more than $1.38 trillion.

Advocates for Highway and Auto Safety (Advocates) urges the House Committee on Energy and Commerce to pass a bill to reauthorize the National Highway Traffic Safety Administration (NHTSA) that seriously addresses the unnecessary and preventable carnage on our roads and highways. Efficient, proven solutions and strategies already are on the shelf and ready to be used. Furthermore, technological solutions to improve the crashworthiness of motor vehicles are available and in use for some makes and models. It is important that this NHTSA Reauthorization bill include provisions that direct the agency to move forward on important, long-delayed rulemakings and data collection to halt the trend of increasing deaths and injuries on our highways.

ADVOCATES URGES PASSAGE OF A NHTSA REAUTHORIZATION BILL THAT ESTABLISHES A SAFETY REGULATORY AGENDA INCLUDING:

- A safer standard for side impact crash protection;
- A rollover prevention standard;
- A stronger roof strength standard;
- A crash ejection prevention standard;
- A safer frontal impact protection standard;
- A standard to reduce vehicle aggressivity and incompatibility;
- Improvements to the safety of 15-passenger vans;
- A standard for child-safe power windows;
- A study of technology to prevent vehicle backover incidents;
- A public database of backover incidents; and
- Improved consumer safety information.

These rulemakings and initiatives are essential to NHTSA Reauthorization. They will save countless lives and help fulfill the *safety* mission of both NHTSA and the TEA-21 Reauthorization legislation.

In order to ensure progress on a broad spectrum of serious safety problems, Congress needs to take the lead and establish clear safety goals that can be achieved in reasonable but certain timelines. This is precisely the approach taken by the House Energy and Commerce Committee in the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act of 2000. During congressional hearings and media attention on the deadly rollover occurrence of Ford Explorers equipped with Firestone tires, it was revealed that neither the federal tire standard nor the roof crush standard had been updated since the early 1970s. Also, warning signs of the potential problem were missed because of inadequate data collection and analysis. The TREAD Act directed NHTSA to undertake numerous rulemakings on a variety of issues related to tire and child passenger safety, including setting realistic deadlines for agency action. This is a model Advocates strongly supports for enactment of the NHTSA Reauthorization legislation in the 108th Congress.

It is imperative that Congress set the safety agenda, as it did in the TREAD Act, to ensure that long overdue safety rules and improvements are completed. The TREAD Act was passed in response to a defect problem that killed several hundred people, yet problems such as vehicle compatibility in crashes and rollover result in thousands of preventable deaths each year. However, without Congressional leadership and clear mandates the NHTSA has been slow to respond.

For example, the issue of vehicle rollover has been a safety threat for over 25 years. More than 110,000 people have been killed in rollover crashes from 1991 to 2002. Yet, despite a prior Congressional directive that NHTSA initiate (but not complete) rulemaking to improve vehicle stability, the agency did not issue a standard. Moreover, even after years of research on improvements that were promised instead of a rollover standard, such as improved roof strength, the agency still has not acted to adopt a real world, dynamic roof crush test. And, although the NHTSA has in recent years emphasized crash avoidance programs that promote the importance of avoiding crashes in the first instance, rollover involved deaths continue to climb each year and a standard to improve vehicle stability and reduce rollover is nowhere to be found.

In order to ensure that the American public is adequately protected from these and the other dire threats to safety mentioned above, it is imperative that Congress require the NHTSA to confront these problems and issue appropriate safety standards that will reverse the rising fatality toll on our nation's roads. Unless Congress requires agency action and final rules by specific dates in this reauthorization legislation, more years will pass without significant agency action to reverse the increasing trend in highway fatalities.

At the same time, it is vital that NHTSA Reauthorization include the necessary funds for the agency to carry out this mission. At present, 95 percent of all transportation-related fatalities are the result of motor vehicle crashes but NHTSA's budget is less than one percent of the entire DOT budget.

Congress has had to act twice since NHTSA was last reauthorized to correct severe funding and regulatory shortfalls. First, when serious problems resulting in deaths and injuries were identified in some passenger vehicle airbags, NHTSA was compelled to issue an advanced airbag rule to upgrade Federal Motor Vehicle Safety Standard (FMVSS) No. 208 to require new tests and advanced technology. Additional funds were needed by the agency to complete the necessary research and data analysis. Second, as part of the passage of the TREAD Act it was again necessary to augment NHTSA's budget to tackle the regulatory and other requirements included in that legislation. Congress must set the agency on the road toward resolving the nation's most serious safety problems, but it must also ensure that the agency has the funding and resources it needs to accomplish that task.

CONCLUSION

Advocates' recommendations for action are common sense, cost effective and will achieve savings in lives and dollars. The fatalities that occur daily and routinely on our highways in motor vehicle crashes are equivalent to a major airline crash every other day of the year. This public health epidemic does not have to continue unabated. Enactment of these proposals will move the agency forward in addressing the unfinished regulatory agenda and will reverse the deadly trend facing us in the coming years.

NHTSA SHOULD ISSUE A RULE THAT IMPROVES STANDARDS FOR SIDE IMPACT CRASH PROTECTION.

About 10,000 people die each year in both single and multiple-vehicle collisions involving side impacts. Deaths have increased and side impact crashes have become more severe over the past decade due to the explosive growth in the percentage of sport utility vehicles (SUVs) in the nation's fleet, followed by increased numbers of pickup trucks and large vans. In side impact crashes, the taller, heavier, and stiffer SUVs, pickup trucks, and large vans cause much more severe impacts with smaller passenger vehicles that result in more serious injuries and more deaths. Purchases of SUVs, pickup trucks, and large vans now comprise one-half of the annual sales of new passenger vehicles and the number of these vehicles on the road has increased dramatically in recent years.

In side impact crashes where a light truck or van struck a passenger car alone resulted, there were approximately 5,400 deaths in each of the last few years, more than 30 percent of passenger car multiple-vehicle collision fatalities. Currently, the motor vehicle safety standards for upper interior side impact (FMVSS No. 201) and lower side impact (FMVSS No. 214) are too weak to adequately protect occupants in a car that is struck by a larger vehicle and need to be upgraded. When NHTSA adopted FMVSS No. 214 back in the early 1990's, it should be noted that the majority of the passenger vehicle fleet already met its compliance requirements, even without additional countermeasures. The standard was indexed to meet the existing protective capabilities of the vehicle fleet, which at that time consisted mostly of passenger cars. Additional side impact protection is needed to keep safety from losing ground with the changing vehicle fleet. For example, enhancing the side impact protection of occupants can be achieved by requiring dynamic impact safety systems, such as air bags, for both upper and lower portions of the vehicle interior.

To date, however, NHTSA has not issued a final rule that improves standards for side impact crash protection. The current side impact standard only addresses vehicles with a gross vehicle weight rating of less than 6,000 pounds.

Advocates supports an improved side impact standard that takes into account the heavier, stiffer light trucks and vans on the road today. This standard should evaluate test barriers, head and neck injury measurements, the need for additional test dummies, and review impact criteria.

NHTSA SHOULD ISSUE A ROLLOVER PREVENTION STANDARD.

Rollover crashes result in a tragedy of massive proportions, with more than 10,000 deaths and hundreds of thousands of crippling injuries to Americans each year. Rollover crashes represent only three percent of all collisions but account for approximately one-third of all passenger occupant fatalities. More than 110,000 people have died in rollover crashes since 1991. Additionally, the soaring popularity of SUVs since the start of the 1990s has resulted in more than doubling their numbers on the road during this period, accompanied by a doubling of fatal rollover crashes. Six of every 10 deaths in SUVs in 2002 occurred in rollover crashes. No other passenger vehicle has the majority of its deaths take place in rollovers. It is very clear

that we are needlessly losing lives in the U.S. because of the tendency of SUVs to roll over in both single and multi-vehicle crashes.

At a press event in 1994, DOT announced several safety initiatives to address rollover crashes in lieu of issuing a rollover stability standard. Nearly ten years later, DOT has made little, if any, progress in completing any of the major actions. NHTSA knows what needs to be done to protect our citizens from the lethal outcomes of rollover crashes. The agency failed to act when the need became clear years ago to stop the annual rise in deaths and injuries from vehicle rollovers.

Yet, here we are almost 10 years after NHTSA terminated rulemaking to set a vehicle stability standard. The American public is placed at increased risk of death and injury every year because of the growing numbers and percentage of SUVs and pickups in the traffic stream. Instead, NHTSA has promised a consumer information regulation to reveal the on-road rollover tendencies of SUVs and pickups. However, that promise is highly qualified. Although the agency issued a rollover rating system based on static stability factor (SSF) and has developed a rating system based on a dynamic test procedure, the agency has warned that it will be years before enough vehicles are tested and enough data from the field are collected to be able to determine if the rollover ratings from dynamic testing are accurate indications of rollover tendencies. So, while NHTSA collects several years of data to determine whether its testing regime is even tenable, the American consumer will continue to buy vehicles that place individuals and families at increased risk of death and debilitating injuries.

Advocates supports NHTSA Reauthorization legislation that requires the agency to issue a final rule on rollover stability that seriously addresses the rising deaths and injuries from vehicle rollovers.

NHTSA SHOULD ISSUE A STRONGER ROOF STRENGTH STANDARD.

NHTSA also needs to improve occupant protection when vehicles roll over. That would be accomplished by improving the resistance of roofs to being smashed and mangled in rollover crashes. The existing vehicle roof strength standard is over 30 years old and has not kept pace with the changing vehicle fleet. In fact, NHTSA's own data indicate the need for an improved standard. In September 2002, the NHTSA Administrator stated that roof crush intrusion potentially contributes to serious or fatal injury in 26 percent of rollover crashes. NHTSA also estimates that belted occupants suffer 1,339 serious or fatal injuries resulting from roof crush intrusion each year.

The current roof crush standard (FMVSS No. 216)—a standard that is weak and ineffective in preventing both general roof collapse and local intrusion in rollover crashes—also exempts all passenger vehicles above 6,000 pounds gross vehicle weight rating. This means that 15-passenger vans, other large vans, small buses, and well-known makes and models of SUVs and pickup trucks, do not have to meet even the inadequate test compliance requirements of the existing standard. The exemptions for larger, heavier passenger vehicles weighing more than 6,000 pounds gross vehicle weight rating from the roof crush standard (as well as a similar exclusion of vehicles over 6,000 pounds from the requirements of the lower interior side impact standard, FMVSS 214) is not supported by any compelling data that these vehicles are somehow safe for their occupants without adherence to even the weak roof crush standards. In fact, some of the vehicles with the worst rollover crash rates and roof failures are among the vehicles exempt from the standard. To complicate the issue further, NHTSA requires all passenger vehicles less than 10,000 pounds gross vehicle weight rating to comply with the head injury protection requirements for upper interior impacts, including side impacts, but does not require similar compliance for vehicles between 6,000 and 10,000 pounds gross vehicle weight rating for lower interior torso protection under Standard No. 214.

Advocates supports an improved roof strength standard based on a dynamic test.

NHTSA SHOULD ISSUE A CRASH EJECTION PREVENTION STANDARD.

According to NHTSA, in 2002, there were 9,543 people are killed and tens of thousands injured—nearly 8,000 suffering severe injuries—because of partial or complete ejection through passenger vehicle doors, windows, and even moon roofs in a crash.

NHTSA researched anti-ejection glazing for years, estimating that up to 1,300 lives could be saved each year by anti-penetration side window glazing, yet suddenly decided that there were insufficient benefits of anti-ejection glazing to continue rulemaking.

The agency also has not acted to upgrade the outdated standard for door latches and locks, which have remained unchanged since NHTSA first adopted an industry standard in the 1960's, and have proven inadequate for decades. Many doors still

fly open in front, side, rear, and rollover crashes. About 2,500 deaths and many more serious injuries occurred annually due to door ejections. Side door ejections are the second leading cause of ejections in all types of crashes, exceeded only by ejections through fixed glazing.

Advocates supports legislation directing the agency to issue a rule to reduce complete and partial occupant ejection from passenger vehicles. Additionally, the agency should consider the ejection mitigation capabilities of safety technologies such as advanced side glazing, side curtains, and side impact airbags. The rule should also address improvements in door locks, latches and other ejection reducing components of the vehicle.

NHTSA SHOULD ISSUE A SAFER FRONTAL IMPACT PROTECTION STANDARD.

The high severity of frontal impact crashes, especially vehicle-to-vehicle crashes, results in high levels of occupant mortality. Nearly 17,000 people died in frontal impacts in 2002. For this reason, occupant crash protection has long depended on the full-frontal barrier test. With the advanced air bag rule now in place, the NHTSA should commence an upgrade of the frontal crash test including the test barrier and more refined measures for frontal injury criteria.

In addition, while the full-frontal barrier test measures the effectiveness of vehicle restraint systems, occupant compartment intrusion would be better tested with the addition of an offset frontal compliance test requirement. A frontal offset test would provide safety benefits especially for lower extremity injuries. Frontal offset or overlap tests have been used in Europe and by the Insurance Institute for Highway Safety for some time, manufacturers are familiar with the test, and for several years, NHTSA has promised to propose adding an offset compliance test to the occupant protection standard, FMVSS 208. Even the Office of Management and Budget (OMB), in a letter dated December 7, 2001, urged the NHTSA to make the adoption of a frontal offset test a "significant priority." In response, the Deputy Secretary of Transportation stated in a letter to OMB, dated January 14, 2002, that the NHTSA would issue an Advanced Notice of Proposed Rulemaking on an offset frontal crash test device in "early 2002." The fact is that the agency only recently issued a notice requesting public comment on technical issues regarding offset frontal crash testing. In light of this history, the agency should be able to move swiftly to adopt such a safety test once rulemaking is initiated.

Advocates supports a provision that requires improvement in frontal impact protection for all occupants by evaluating need for additional test procedures, barriers, and injury and impact criteria, and the adoption of a frontal offset compliance test.

NHTSA SHOULD ISSUE A STANDARD TO REDUCE VEHICLE AGGRESSIVITY AND INCOMPATIBILITY.

Vehicle aggressivity and incompatibility needlessly contribute to motor vehicle deaths and injuries. Large SUVs, pickup trucks, and full-size vans are disproportionately responsible for increasing the number of deaths and injuries when they collide with smaller passenger vehicles, including impacts even with small SUVs and mini-vans.

According to NHTSA, the number of passenger car occupants dying in two-vehicle crashes with light trucks or vans increased in 2002 compared to 2001, while the number of fatalities in light trucks or vans actually decreased. These mismatch crashes are especially lethal when two factors are present: first, the heavier, bigger vehicle is the "bullet" or striking vehicle and the lighter, smaller vehicle is the "target" or struck vehicle, and, second, the bigger vehicle hits the smaller vehicle in the side. In these circumstances the consequences are fairly predictable. The bigger, heavier, higher vehicle rides over the lower door sills of the side of the small vehicle in a side impact, or rides above its low crash management features in a frontal collision. As a result, the smaller vehicle's occupant compartment suffers enormous deformation and intrusion from the impact with the bigger vehicle. According to NHTSA, for cars struck in the near side by pickup trucks, there are 26 fatalities among passenger car drivers for each fatality among pickup truck drivers. For SUVs, the ratio is 16 to 1.

To date, NHTSA has not adequately address this tremendous "harm difference" between the biggest, heaviest members of the passenger vehicle fleet and smaller vehicles. The agency needs to reduce the aggressivity of larger vehicles and simultaneously improve the protection of occupants in the smaller, struck vehicles by undertaking regulatory actions on an accelerated calendar.

Advocates and others in the highway safety community are concerned that rhetoric does not match reality and the problem will continue to grow as LTVs become a larger percentage of the vehicle fleet. There are several actions the agency should

be taking in order to address this growing problem. For example, in the area of research, NHTSA's National Center for Statistics and Analysis currently collects detailed crash information for a sample of moderate to high severity crashes. However, the data points collected do not adequately document and illuminate the most critical aspects of passenger vehicle to passenger vehicle crashes, especially those involving mismatched pairs. Similar change should apply to all agency data collection from real world crashes. Data collection would be further enriched if the number of cases investigated were increased to improve the ability of the agency to generalize about the reasons for vehicle responses and occupant injuries in crashes involving incompatible passenger vehicles.

NHTSA also can improve the compatibility between larger and smaller makes and models of the passenger fleet by reducing the aggressivity of larger vehicles, especially light trucks and vans. Lowering the front end height difference of larger, heavier vehicles to match the front ends and sides of smaller vehicles will prevent larger vehicles from riding over the front ends and side door sills of smaller passenger vehicles. Furthermore, simultaneously reducing the crash stiffness of larger pickup trucks, SUVs, and big vans would ensure that crash forces are more evenly distributed between larger and smaller vehicles in both front and side in multi-vehicle collisions, which would improve safety.

Advocates supports a provision that requires NHTSA to issue a safety standard to reduce vehicle incompatibility and aggressivity considering factors such as bumper height, weight, and design characteristics to manage crash forces in frontal and side impact. NHTSA should also develop a standard metric to rate and compare aggressivity and incompatibility between different vehicles. Finally, NHTSA should initiate a public awareness program—including ratings—that provides comparative rates of the risk to vehicle occupants and other vehicles.

NHTSA SHOULD IMPROVE THE SAFETY OF 15-PASSENGER VANS.

Perhaps one of the clearest indications that NHTSA needs to control basic vehicle designs that consistently produce high rates of rollover crashes are the horrific rollover crashes among 15-passenger vans. A study released by NHTSA in late 2002 showed how, in 7 states, 15-passenger vans as a class—regardless of the number of passengers on board—are substantially less safe than all vans taken together. The data from FARS for the year 2000 showed that 17.6 percent of van crashes involved rollovers, not significantly greater than passenger cars at 15.3 percent. However, single vehicle rollover crashes of 15-passenger vans happen more frequently than with any other van when there are 5 occupants or more being transported. When these big vans have 5 to 9 passengers aboard, almost 21 percent of their single-vehicle crashes are rollovers. When the passenger load is between 10 and the maximum seating capacity of 15 occupants, single-vehicle rollovers are 29 percent of all van crashes. Even more dramatic, when 15-passenger vans are overloaded, i.e., more than 15 passengers on board, 70 percent of the single-vehicle crashes for these extra-heavy vans were rollovers. These findings are similar to those of the National Transportation Safety Board (NTSB), released in October 2002, that found 15-passenger vans with 10 to 15 passengers onboard had a rollover rate about three times greater than that of vans seating 5 or fewer passengers. In addition, NTSB found that 15-passenger vans carrying 10 to 15 passengers rolled over in 96 of the 113 single-vehicle crashes investigated, or in 85 percent of those crashes.

Unfortunately, NHTSA has only issued advisories about more careful operation of these vans and the use of better-trained drivers, and has even stated that there is nothing inherently defective about their design. These disclaimers about the intrinsically poor stability and safety of 15-passenger vans are unsettling when they are viewed in relation to two safety recommendations issued by the NTSB on November 1, 2002 to NHTSA and to two vehicle manufacturers, Ford Motor Company and General Motors Corporation. The NTSB recommendations asked NHTSA to include 15-passenger vans in the agency's rollover testing program and to cooperate with vehicle manufacturers to explore and test technologies, including electronic stability systems, that will help drivers maintain stable control over these vehicles.

Unfortunately, 15-passenger vans, as well as larger passenger vehicles, especially medium and large SUVs and vans, along with small buses, are often exempted from key NHTSA safety regulations for crashworthiness. For example, because of the distance of seating positions in 15-passenger vans from side doors and the fact that the vans weigh more than 6,000 pounds, the lower interior side impact protection standard (FMVSS No. 214) does not apply to these big vans. This major safety standard also does not apply to any vehicles exceeding 6,000 pounds, or even to certain vehicles under this weight limit, such as walk-in vans, motor homes, ambulances, and vehicles with removable doors. Bigger passenger vehicles, then, as well

as certain kinds of smaller passenger vehicles, are exempt from the minimal protection required by FMVSS No. 214.

Advocates supports extending federal motor vehicle safety standards to vehicles up to 10,000 pounds gross vehicle weight and other improvements such as including 15-passenger vans the New Car Assessment Program and an evaluation of technology to improve stability.

NHTSA SHOULD ENHANCE THE SAFETY OF CHILDREN IN AND AROUND CARS BY ISSUING A STANDARD FOR CHILD-SAFE POWER WINDOWS AND STUDYING BACKOVER INCIDENTS AND AVOIDENCE TECHNOLOGIES.

Motor vehicle crashes are the leading cause of death and injury to children. In 2002, 2,542 children under the age of 16 were killed in motor vehicle crashes and over 300,000 were injured. This means that every single day in the United States, nearly seven children under the age of 16 are killed and 850 are injured in car crashes. Clearly more needs to be done to protect our children. Two reasonable steps can be taken to address part of this safety problem.

First, Advocates urges the Energy and Commerce Committee to address the issue of children who are left unattended in vehicles or standing behind vehicles that are placed in reverse, resulting in unnecessary deaths and injuries each year. Non-profit organizations, such as Kids and Cars, have documented in private research the deaths of hundreds of children who were left in cars when outside temperatures soared, who were inadvertently killed when a car or truck backed over them, or who were killed or injured by power windows and sunroof systems that were not child-proof. It is time that NHTSA lead the effort to collect data on child fatalities and injuries that occur in or immediately outside the car, although not on public roadways. Also, NHTSA needs to analyze the data and act to remedy safety inadequacies affecting children.

Second, the technology to ensure that power windows and sun roof systems are child-safe exists and is used in vehicles sold in Europe and Japan. Window switches that are pulled up to close the window, and pushed down to open them are highly successful in preventing power window injuries to children. That same technology should be required in all passenger vehicles sold in the U.S.

Several years ago the NHTSA initiated rulemaking to consider what could be done to keep small children from activating power windows to close when they leaned on them with their knees. But the preliminary proposal didn't keep children from inadvertently closing these guillotine windows with their elbows. This rule could be completed by adopting the highly successful approach taken in Europe and Japan.

Advocates supports NHTSA Reauthorization legislation that directs NHTSA to collect and publish data on child fatalities and injuries in parked or inoperable vehicles and from strangulation and injuries involving automatic windows, and those from backing up collisions. NHTSA also should be required to ensure automatic window systems will not kill or injure children.

NHTSA SHOULD IMPROVE CONSUMER SAFETY INFORMATION.

In 2002, more than 16.8 million new cars were sold in the United States. However, consumers entering dealer showrooms were hampered in making educated purchasing decision because of a lack of comprehensive, comparative information on the safety performance of different makes and models of automobiles. Readily accessible consumer information on the comparative safety of vehicles and vehicle equipment remains woefully inadequate. After purchasing a home, buying a car is the next most expensive consumer purchase, yet the majority of consumers end up at the mercy of the sales pitch and without recourse to objective information in the showroom. While energy conservation information is required on home appliances and other household items and even on passenger vehicles, critical safety information is not required on vehicles at the point of sale. The fact is consumers get more information about the health and safety value of a box of cereal than they do about vehicles in the dealer showroom.

Providing vehicle buyers with important safety information at the point of sale is not a new idea. In 1994, the Secretary of Transportation suggested just such a label but it was never implemented. In 1996, the National Academy of Sciences issued a report that called for providing consumers with more and easier to use safety information, including a vehicle safety label with a summary safety rating. (*Shopping for Safety,* Transportation Research Board Special Report No. 248, National Academy of Sciences (1996).)

There is no doubt that consumers continue to clamor for helpful information about vehicle safety. A safety label on the vehicle will ensure that every purchaser will

at least be aware of the same basic, objective safety information for every vehicle they are interested in buying. Additionally, NHTSA should release to the public all types of vehicle safety information including early warning information that Congress requires the agency to collect under the TREAD Act. In this way, consumers will be knowledgeable about the real world performance of vehicles they purchase and drive.

The NHTSA New Car Assessment Program (NCAP) conducts frontal and side impact crash tests on new cars, and has recently begun to provide rollover ratings on new vehicles. Despite problems regarding NCAP ratings that have been vigorously debated in the past, NCAP provides the only vehicle-to-vehicle comparative ratings that are available from the government. Although the NCAP ratings are available to the public and used by the media, consumers do not necessarily access that information or have it available in the showroom when considering a vehicle purchase. Consumers would be well served by having the NCAP ratings on a vehicle safety sticker affixed to a window.

Advocates supports requiring new vehicles be labeled with the NCAP star ratings for frontal impact, side impact, and rollover.

PREPARED STATEMENT OF JOAN CLAYBROOK, PRESIDENT, PUBLIC CITIZEN

Thank you, Mr. Chairman and members of the House Commerce, Science and Transportation Committee, for the opportunity to offer this written testimony on the importance of improvements in vehicle safety. My name is Joan Claybrook and I am the President of Public Citizen, a national non-profit public interest organization with over 150,000 members nationwide. We represent consumer interests through lobbying, litigation, regulatory oversight, research and public education. Public Citizen has a long history of working to improve consumer health and safety.

Vehicle crashes are the leading cause of death for Americans from 2 to 33—and kill 117 people every day of the year. Nearly a third of the people killed die in rollover crashes. The National Highway Traffic Safety Administration (NHTSA) estimates the direct cost in worker productivity and other economic losses from vehicle crashes is $230 billion each year (in 2000 dollars), or $820 for every man, woman and child in the U.S.[1]

The problem is only getting worse. In 2002, highway deaths reached 42,815, the highest level since 1990. An astounding 82 percent of the increase in deaths between 2001 and 2002 occurred in rollover crashes. Rollover-prone SUVs and pickups, combined with vans, now are 49 percent of new passenger sales and 36 percent of registered motor vehicles—a 70 percent increase between 1990 and 2000. Although NHTSA and the auto industry have known about the dangers of vehicle rollover and aggressivity for several decades, safety rules continue to lag far behind these market trends.

Federal regulators acknowledge that the number of lives lost is far too high. Dr. Jeffrey Runge, Administrator of NHTSA, predicted last year in Newsday that the total dead could reach 50,000 annually in 2008. “This is a Vietnam War every year,” he said. “That’s just not tolerable.” Public Citizen agrees—something must be done to address the unconscionably high loss of life on our roadways.

The bi-partisan McCain-Hollings-Snowe-DeWine vehicle safety provisions in S.1072, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003 (SAFETEA), would prevent thousands of needless deaths on the highway each year. These measures address long-overdue safety priorities that will continue to cost lives unless they are prioritized by Congress. The bill includes rollover prevention and survivability safeguards, ejection prevention measures, and vehicle compatibility measures. Also important are additional protections for 15-passenger vans and child safety both in and around vehicles. All of these are obvious, common-sense fixes which target the areas where lives may be saved cost-effectively, with feasible and available safety technology and design improvements.

Vehicle Safety Work Left Unfinished by Congress in 2000

In 2000, Congress quickly passed the Transportation Recall Enhancement Accountability and Documentation (TREAD) Act in the wake of the Ford/Firestone tragedy—but as Sen. John McCain (R.-AZ) said on the floor the day the Act was passed, major vehicle safety issues would have to be revisited.

The final bill failed to address key vehicle safety issues raised by the Ford/Firestone tragedy. As Senator McCain said on the floor of the Senate, October 11, 2000:

I say to my colleagues again that this issue isn’t over. Tragically, I am in fear that there will be more deaths and injuries on America’s highways before we finally make it much safer for Americans to be on America’s highways.

The Senator's words are sadly prophetic. Almost all of the 200 lives lost, and 700 known injuries, through the year 2000 from Ford Explorers with Firestone tires occurred when these vehicles rolled over. Since then, numerous lives have been lost when SUVs rolled over in crashes, roofs collapsed upon occupants, or occupants were violently ejected from the vehicle.

While the TREAD Act focused on information collection on defects and upgrades to the tire safety standard, among other items, fixing the tires was not even half of the battle, and many hazards remain unaddressed. We urge the House of Representatives to continue the lifesaving work begun in TREAD by addressing the vehicle to improve safety. The vehicle safety provisions in Title 4 of SAFETEA 2004 would establish rollover prevention and protection standards, anti-ejection standards, a standard to prevent the extensive harm from vehicle mismatch, and other crucial, long-overdue safeguards. It is time to ask American automakers to build a safer, better vehicle.

Cost-Benefit Canards and Auto Industry Myths

While the auto industry claims the "low hanging fruit" in vehicle safety has been picked and that additional regulations will have merely diminishing returns. This is not correct. In rollover crashes alone, 10,600 lives are lost annually—one-third of all occupant deaths—and this crash mode remains virtually unregulated while the death toll rises every year. The industry has known for decades about the need to improve vehicle rollover resistance and roof strength, as well as the problem of vehicle mismatch in crashes, called "compatibility" and need for improvements in child safety. Yet little has been done in these critical areas.

Bipartisan safety provisions in Title IV of the Highway Funding bill, passed by the full Senate on February 12, 2004, would be enormous step towards addressing the lives unnecessarily lost in crashes. The safety hazards addressed by the bill target those areas where new safety rules would do the most amount of good, and are feasible and reasonable next steps.

While the TREAD Act passed in the wake of the Ford/Firestone tragedy provided some new authority for NHTSA, it did not address SUV hazards that continue to cost record numbers of lives each year. Estimates of the lives to be saved are well above the numbers of people killed in the Ford/Firestone tragedy. The measures in the Senate highway bill would save thousands of lives:

- A new roof crush resistance standard: 1,400 deaths and 2,300 severe injuries, including paraplegia and quadriplegia, would be prevented each year by a more stringent standard.[2]
- Improved head protection and side air bags: 1,200 lives saved, and 975 serious head injuries prevented, would be saved by a new requirement each year.[3]
- Side window glazing ("safety glass"): A requirement would save 1,305 lives and prevent 575 major injuries each year.[4]
- Upgrade to door locks and latches standard: An upgrade would prevent hundreds of the 2,500 door-related ejection deaths each year.[5]
- Rollover prevention standard that examines use of electronic stability control (ESC): Several comprehensive studies estimate that ESC technology reduces deaths and injuries by as much as *one-third* by preventing crashes for occurring in the first place.[6]
- Compatibility standards for light trucks: NHTSA research estimates 1,000 lives a year could be saved.[7]
- Stronger seatback design: 400 lives saved, and 1,000 serious injuries prevented, each year.[8]
- Effective seat belt reminders in all seats: 900 lives each year would be saved by such a requirement.[9]

Preventing these deaths would save taxpayers billions of dollars in direct costs alone, and prevent untold suffering. Requirements for the issuance of new and upgraded rules in all of these areas are contained in the lifesaving NHTSA Reauthorization bill that passed the full Senate. The ongoing public relations effort on the part of the industry to downplay risks and avoid new rules should be dismissed by policy-makers and the media as an avoidance maneuver that is both wrong on the facts, and coldly indifferent to the potential for saving lives.

Answering the industry: A history of select life-saving safety measures since 2000

A recent article[10] cited the auto industry as suggesting that three recent rulemakings demonstrate that safety rules are yielding limited returns: advanced air bags, tire-pressure monitoring systems, and fuel system integrity. In each case, the story has been distorted.

The real story on advanced air bags

In 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA), was enacted into law. ISTEA requires all passenger cars manufactured on or after September 1, 1997, and light trucks manufactured on or after September 1, 1998, to have driver and passenger air bags, plus manual lap-shoulder belts in accordance with the safety standards issued by Secretary of Transportation Elizabeth Dole in 1984. Unfortunately, after arguing for a performance standard, many manufacturers responded by creating cut-rate airbags that were dangerous to children and small adults.

It is important to note that not all airbags, as originally designed, were unsafe. From the beginning, Honda designed airbags that never killed a single child, showing that good design was possible under the Dole rule. The industry in fact has an obligation, which it largely failed to meet, to make designs that encompassed all likely uses by customers, and did not cut corners to achieve the bare minimum for compliance with the standard.

Because of the danger posed by shoddily designed airbags on the market in the early 1990s, new "advanced" airbag rules had to be promulgated to protect children and small-statured women. In 1998, the Transportation Equity Act for the 21st Century (TEA-21) was passed by Congress, requiring that airbag safety "improve occupant protection for occupants of different sizes, belted and unbelted . . . while minimizing the risk to infants, children, and other occupants from injuries and deaths caused by air bags, by means that include advanced air bags."

In 2000, NHTSA promulgated a new advanced airbag rule, but caved to auto industry pressure and decreased the test speed from 30mph to 25mph. Public Citizen and other safety groups have challenged the decision to lower the test speed in federal court, and the case is now pending.

A *USA Today* article highlights the lack of deaths from air bags, which has been a welcome result of efforts to move children into the back seat of vehicles, but implies the rule only has minimal benefits. NHTSA's actual findings on the costs and benefits of the advanced air bag rule included the following:

- More than 95 percent of the at-risk population in low speed deployments would be protected by technologies to meet the rule's requirements.
- The cost per vehicle for the compliance options for consumers (or retail cost) is between $21 and $128 per vehicle (in 1997 dollars)—most consumers would happily pay that, given the major investment a vehicle represents and the value of safety to consumers.
- Property damage savings alone is over $85 per vehicle, or $1.3 billion in savings from the rule in property damage alone, while the overall maximum total cost in the most expensive compliance scenario is a comparatively small $2 billion.
- NHTSA reduced the likely benefits because it also lowered the testing speed to 25 mph. Because this produces a less protective air bag in high-speed crashes, Public Citizen has challenged this decision in court. A 30 mph standard would raise the amount of benefits (i.e., the number of lives saved) anticipated from the rule.

The real story on tire pressure monitoring systems

The Transportation Recall Enhancement, Accountability and Documentation (TREAD) Act, passed in the wake of the Ford/Firestone fiasco, required the Secretary of Transportation to mandate, within one year, a standard that would mandate a warning system in new vehicles to alert operators when their tires are underinflated. After extensive study, NHTSA determined that a direct tire pressure monitoring system should be installed in all new vehicles. But in a "return letter" issued after meetings with the auto industry, the Office of Management and Budget (OMB) demurred, claiming its cost-benefit calculations provided a basis for delaying a requirement for direct systems. The final rule, issued May 2002, would have allowed automakers to install ineffective TPMS and would have left too many drivers and passengers unaware of dangerously underinflated tires.

In June 2002, Public Citizen joined with other consumer safety groups to sue NHTSA because its final rule would have allowed manufacturers to choose to install the inferior (indirect) system. A year later, in August 2003, a unanimous three-judge panel of the United States Court of Appeals for the Second Circuit ordered NHTSA to rewrite the rule, agreeing with Public Citizen and others that NHTSA acted in an arbitrary and capricious manner by allowing installation of a clearly faulty (indirect) system.—

In its decision, the Court reminded NHTSA that the notion that "cheapest is best" is contrary to Supreme Court precedent that safety improvements are a core responsibility of federal regulators. The court also reminded NHTSA that, in doing its cost-

benefit calculations, the agency is supposed to "place a thumb on the safety side of the scale."[11]

The USA Today article gets the numbers wrong;[12] however, as the Court stated, the numbers are in fact beside the point. The real cost of the industry's undue influence over an improper rule is that no rule is now on the books despite clear directions from Congress to protect consumers from the harmful effects of tire under-inflation. For each year of obfuscation and delay, NHTSA's own cost-benefit analysis shows that 142 lives are needlessly lost on the highway.

In the eight months since the rule was overturned by the Court, NHTSA has also failed to re-issue the rule, despite the substantial factual record collected by the agency in rulemaking which should make a new final rule an easy matter. Should NHTSA continue to delay, Public Citizen plans to bring an unreasonable delay case against the agency to encourage more timely action.

The real story on the fuel system integrity upgrade

About 15,820 occupants are exposed to a post-crash fire each year—736 of whom received moderate or severe burns, three-quarters of whom had second or third degree burns over more than 90 percent of their body. In 2001, 1,449 occupants died in crashes that involved fire and in 341 of those cases, fire was the most harmful event in the crash. Preserving fuel system integrity in crashes is necessary to reduce these unnecessary deaths and injuries.

NHTSA recognized this need in the 1970's, implementing the first requirement for fuel system integrity. The agency did not consider upgrading the standard until 1995 and did not promulgate an actual upgrade until December, 2003.

The upgrade proposed by NHTSA falls vastly short of the mark of what is necessary in rulemaking on this issue. There are two prominent explanations for the very low benefits associated with NHTSA's new fuel system integrity rule. First, NHTSA's data collection on fire-related deaths is extremely poor, and does not include roadside crashes, such as those involving police cars and the now-notorious Crown Victoria, which bursts into deadly flames when hit in the rear. Second, the new standard is so weak that most vehicles currently on the road pass the new standard. Even the CK pickup truck, which is associated with more than 2,000 terrible fire deaths, would pass. Where a standard is so inadequate, the benefits are also small.

The worst performers, known for killing hundreds in vehicle fires, the CK Pickup and the Crown Victoria, both pass the agency's new standard test. Crown Victoria crashes have burned to death at least 18 police officers, and GM C/K pickups have caused over 2,000 fatalities, yet NHTSA estimates its rule would save only 8 to 21 fatalities a year (of a total of, in NHTSA's count, an extremely low 58 burn deaths a year). The lesson? When a rule is too weak to require safety upgrades, the corresponding benefits, or number of lives saved, is also far too low.

The cost-benefit analysis on the upgrade of fuel system integrity available is based on NHTSA's extremely conservative analysis of an extremely inadequate standard. The low-ball savings estimated by the agency are 8 to 21 fatalities per year, and no injury prevention numbers were calculated. The costs for complying with this upgrade are minimal as well—only $5.31 per vehicle for rear impact test and because the agency combined two side impact tests, the manufacturers will actually save money on the standard for side impacts—savings of about $25,200 per model. Only one in 100 vehicles that were tested under the new standard failed "more evidence that it does not meaningfully move the ball forward on safety.[13]

New Safeguards Needed for Rollover Prevention and Survival

Rollover crashes are rare events, representing only 2.5 percent of all crashes. Yet rollovers cause approximately 10,600 fatalities—a full one-third of all vehicle occupant deaths—and 21,000 serious injuries each year.

SUVs and pickup trucks are a major part of the rollover problem: while 23 percent of passenger car occupant fatalities occur in rollover crashes, a whopping 61 percent of SUV occupant fatalities and 45 percent of pickup fatalities do.[14] The high frame and unstable design of these vehicles make SUV and pickup rollovers particularly likely, and the weak roofs and poor crash protection make rollovers particularly deadly for people when they do occur.

The high propensity of SUVs and pickups to rollover

The high center of gravity of SUVs and pickups and narrow track width makes them unstable during emergency maneuvers, such as swerving to avoid another vehicle, pedestrian or curb, or during a tire blowout. Loading of the vehicle, which is encouraged in SUVs and pickups by the large cargo areas, raises the center of gravity of the vehicle, making it more dangerous and hard to control. Some vehicles are so tippy that even driving experts are unable to control them. In a rollover propen-

sity test of the Ford Explorer by Little Rock, Arkansas, trial attorney Tab Turner, even an expert driver aware of the planned timing of the tire blowout was unable to keep the vehicle from rolling over.

And the problem is growing. The rate of passenger car occupants who died in fatal rollover crashes per 100,000 registered vehicles declined 18.5 percent between 1991 and 2000, while the rate of light truck occupants who died in fatal rollover crashes increased 36 percent between 1991 and 2000.[15] Rollover fatalities in all types of vehicles accounted for 82 percent of the total fatality increase between 2001 and 2002.[16]

Although charged by Congress to prepare a rollover propensity minimum standard in 1991, NHTSA terminated rulemaking on the standard in 1994. NHTSA defended its termination by citing obsolete statistics on the number of SUVs in the vehicle population in the late 1980s, without acknowledging the growing popularity and hazards of this vehicle class. At that time, NHTSA promised that a consumer information program and numerous crashworthiness protections would be forthcoming.

A decade and thousands of rollover deaths later, in January 2001, NHTSA at long last published very basic information based on a static measure of the rollover propensity of vehicles as a part of the agency's New Car Assessment Program (NCAP), which assesses a mere 40 or so vehicles in each model year. Rather than prominently displaying a vehicle's safety ratings next to the sticker price to help consumers make informed purchases, the safety information is only available on the agency's Web site, where many consumers do not know to look. NHTSA claimed that its program would highlight the poor performers and that public pressure would force manufacturers to improve the rollover tendencies of vehicles. The "Stars on Cars" program sponsored by Senator Mike DeWine and made part of the Highway Funding Bill passed by the Senate would fix this serious oversight by mandating that NCAP information be available on the window sticker at the point-of-sale. We urge the House of Representatives to enact a similar provision.

The Transportation, Recall Enhancement, Accountability and Documentation (TREAD) Act, passed in the wake of the Ford/Firestone disaster, included a requirement for a dynamic rollover consumer information program to be added to NCAP on the NHTSA Web site. In October of 2003, NHTSA adopted a "fishhook" maneuver as a dynamic procedure to be combined with a static measurement of a vehicle's stability for the consumer ratings. Four months later, the first round of ratings were published, again only on the agency's Web site.

While the dynamic test provides an indication of on-road performance, the absence of a standard, or performance "floor" means that every vehicle starts with at least one star, and inflates the performance results on the tests (*i.e.,* with a two-star "floor," vehicles now earning three stars would receive substantially lower ratings). Moreover, the agency's dynamic test is so weak that vehicles that experience vehicle "tip-up" during the test will not lose a star, yet tippy vehicles that do not tip-up in the test can gain a star, making the dynamic test a one-way ratchet.

Poor vehicle design increases rollover hazards

Despite the unconscionably high death toll, rollovers are actually highly survivable crashes. The forces in the collision are far lower than those in many other types of highway crashes. Race car drivers, who wear five point belts and drive vehicles with strong crash protections, often walk away from severe crashes that would be deadly in other vehicles because of superior crashworthiness designed into their vehicles. This survivability means that rollovers are primarily dangerous due to poor vehicle design. Safety belts and seat structures do not keep occupants in place during a crash, and vehicle roofs are so flimsy that they crush into occupants' heads and spines, inflicting very serious injuries.

These important crash protections are also missing in most vehicles, even in pickups and SUVs where rollovers are relatively common. The box-like, windowed passenger area of an SUV or pickup (called the "greenhouse"), protrudes into the air and in a roll hits the ground with more force due to its shape. Rolling "like a box" creates a more violent rollover crash upon impact with the ground, in comparison with the crash dynamics of passenger cars, which roll more like tubes. Centrifugal forces push passengers' heads towards the outside of the roll and into contact with the vehicle's sides and roof just as the vehicle impacts the ground, frequently crushing inward with deadly consequences.

These heightened risks distinguish SUVs and pickups from passenger cars and in part may account for the dramatically higher rollover fatality rates.

In addition, the heavy bodies and engines of light trucks place greater pressure on the roof during a roll, making roof strength a paramount concern for drivers of these vehicles. Most roofs are not strong enough to withstand the impact of a roll-

over crash. The current roof crush standard became effective in 1973 and has been revised since that time only for extension to vehicles with a gross vehicle weight (GVWR) of 6,000 pounds or less and to apply to vehicles with raised roofs.[17] This weight limit has allowed manufacturers to increase the gross weight of SUVs and pickups over 6,000 pounds to evade the standard, meaning that the vehicles most in need of a strong roof are totally unregulated. The weight limit should be raised by Congressional action to 10,000 pounds to correct this egregious oversight, as it is in the Senate bill.

NHTSA's 1994 termination of work on a rollover propensity standard was followed by subsequent public statements in which the agency promised many crashworthiness improvements, including a stronger roof crush standard as well as requirements for better door latches, door hinges and upper side impact protection. Among these tragically broken promises, the roof crush standard remains far out-of-date.

In order to "beat" the standard in recent years, manufacturers have taken the short cut of merely improving the bonding of the windshield to the vehicle structure, which helps the vehicle pass NHTSA's weak test without helping occupants, because in a crash the windshield is typically gone by the end of the first roll. Once the windshield is gone, typically one-third of the roof strength disappears with it, and the roof crushes.

When roofs crush in a rollover, the cardinal rule that occupant space not be intruded upon is broken. The survival space for occupants is greatly limited or eliminated altogether, so that the heads and spines of occupants contact the roof. In addition, roof crush can open ejection portals—making windows and the windshield area very large and leading to ejection of occupants, which is frequently fatal.

The current roof crush standard is woefully out of date. It tests just one side of the roof and passes vehicles that with roofs that collapse and kill occupants in real crashes on the highway. NHTSA estimates 3,700 belted passengers are killed each year by collapsing roofs and a more rigorous roof-crush standard would save 1,400 people. Its estimate is likely too low: it excludes occupants who are ejected when roof crush opens ejection portals, as well as occupants killed by roof collapse before being ejected. Approximately 13,000 fatalities each year involve ejection: 8,000 people are ejected through windows, while 2,500 are ejected through open doors. And, although rollovers remain one of the most survivable crash types, inadequate crash protection standards or lack of safeguards make rollovers unnecessarily deadly crashes, exposing people to seat failure, safety belt failure and ejection.

The image above depicts the fixture used to conduct roof crush dynamic testing in a testing laboratory in Salinas, California. The roadway surface moves forward along the track, contacting the roof of the vehicle as it rotates on the spit. The test surface impacts both sides of the roof a single time, imitating the first roll of a vehicle in a rollover crash, with repeatable results. The picture shows a 1994 Chevrolet Suburban with two dummies inside.

The current federal test is a static test using a platen, or plate, on the roof, and measures the impact of force on only one side of the roof through the steady exertion of pressure. While a static test measures the strength of the roof, a dynamic tests measures injury to the occupants.

A dynamic test such as the one above is far superior for the following reasons:

By showing the impact of the crash on instrumented dummies, it measures the occupant protection and survivability of the rollover crash' the human impact;

It is capable of testing safety belt performance and failure in a rollover crash;

It includes the lateral or sliding velocity of the roadway as it moves beneath the vehicle, as in a real-world rollover crash (the vehicle is *both* rolling and sliding on the road surface);

It tests *both sides* of the roof—the current test only tests one side, with the windshield intact. Yet research shows that passengers sitting in the seat below the second, or trailing edge, of the roll, are the ones severely injured or killed. At the second impact, the roof's integrity has been compromised and crush is typically far more severe.

It shows harm after the windshield shatters in the first impact. While windshields typically break on the first roll, the windshield and its bonding provide as much as one-third of the roof strength.

The test shows the real dynamic of crush as a function of roof geometry (roundness, curvature, etc.). Because the static test is not designed to measure the role of roof geometry, it fails to include a major factor in measuring occupant survivability.

Dynamic drop tests for roof strength are repeatable and have long been in use by industry. As a 2002 Society of Automotive Engineers (SAE) paper attests:

The automotive industry and researchers have used drop testing for years to evaluate roof strength. In the late 1960s's, SAE developed a standardized procedure to perform full vehicle inverted drop testing. Many domestic and import auto manufacturers have utilized the inverted drop test technique as far back as the 1960s and 1970s to evaluate roof strength . . . Mercedes-Benz continues to use inverted drop testing as one of their many standard crash tests and has recommended inverted drop tests in its comments to the docket regarding roof strength rulemaking.[18]

The House of Representatives should enact measures for rollover prevention and survival:

- A rollover resistance standard that will require design improvements in the tippiest vehicles and support the use and further development of technologies to improve roll resistance and vehicle handling.
- A roof strength dynamic test standard to prevent extensive roof collapse, which can measure injuries to people in evolving crash situations and test safety belt performance in rollovers.
- A rollover crashworthiness standard, including improved seat structure, safety belt design (with safety belt pretensioners that tighten in a rollover crash), side impact airbags and roof padding protection, all of which will dramatically increase rollover survivability.
- An ejection mitigation standard using a combination of safety technologies, including advanced safety window glazing, side window curtain airbags and side impact airbags.
- An upgraded door lock and retention standard to reduce door openings in rollovers and other crashes and prevent ejection.
- An enhancement of the NCAP program that would mandate crash ratings (frontal, side and rollover) be added to the manufacturer's window sticker so that consumers are provided with the information when they go to purchase a vehicle.

Addressing Vehicle Mismatch in Crashes to Level the Playing Field

The growing number of light trucks on the highway is contributing to the increasing fatalities in crashes between light tucks and passenger cars, showing vehicle incompatibility and aggressivity is a serious problem. The design of light trucks—and large SUVs and pickup trucks in particular—with a high center of gravity, high bumpers, and steel bars and frame-on-rail construction, makes these vehicles act like battering rams in a crash with another vehicle.

While the National Highway Traffic Safety Administration has taken a few tentative first steps, there are few signs that NHTSA and the auto industry are treating this grave problem with the needed seriousness and expediency.

The problem is a serious one:

- When an SUV strikes the side of a passenger car, the car driver is 22 times more likely to die than is the driver of the SUV. When the striking vehicle is a pickup, the car driver is 39 times more likely to be killed.
- NHTSA's Administrator estimated as long ago as 1997 that the aggressive design of light trucks kills 2,000 additional people needlessly each year.[19]
- Another analysis found that 1,434 passenger car drivers who were killed in collisions with light trucks would have lived if they had been hit instead by *a passenger car of the same weight as the light truck,* even under the same crash conditions.[20]
- For every Ford Explorer driver saved in a two-vehicle crash because that driver chose an Explorer over a large car, five drivers are killed in vehicles hit by Explorers.[21]

Auto manufacturers have responded to the carnage inflicted on other motorists from light trucks' high bumpers and menacing front grilles, by building ever-more heavy and aggressive SUVs over time and continuing to market them militaristically, such as with ads calling the Lincoln Navigator an "urban assault vehicle." In fact, General Motors' Hummer is a direct adaptation of a military vehicle. The chief designer of the 2006 Toyota Tundra recently bragged that his threatening design for the huge pickup truck is intended to highlight "the power of the fist."[22]

Despite shocking highway statistics and mounting research, in its June report NHTSA focuses myopically on only the struck vehicle—*bulking up cars, but ignoring the equally important challenge of changes to reduce the aggressiveness of pickups and SUVs.* Rather than addressing the issue directly, NHTSA's proposal mimics, to a disturbing degree, industry suggestions that overwhelmingly focus on occupant protection in the struck vehicle, support only voluntary measures, and distance themselves from design changes to make the striking vehicle less aggressive. While

improving occupant protection is critically important, the total crash dynamic can and must be considered.

An Attempt to Stave Off Real Action: Promises, Promises by Manufacturers, Ratified by NHTSA

In December 2003, auto manufacturers announced a voluntary initiative to address incompatibility and aggressivity. Their plan, currently to be phased-in on most vehicles by September 2009, would gradually increase the numbers of side impact air bags in vehicle and lower the bumpers of SUVs or add a barrier to prevent them from riding over cars.

Yet the Alliance made no specific or time-bound commitments to redesign vehicles to protect consumers, despite the fact that pickup trucks act as battering rams in crashes, and that the height and stiffness of SUVs makes them devastating on the highway. *Moreover, there is no requirement that all vehicles become compliant with the plan, and no outside body will verify vehicle compliance.* While the commitment may increase occupant protection, it does little to address the violence that will be inflicted by the striking vehicle in crashes, ignoring the need to reduce stiffness and address ever-larger vehicle weights.

A voluntary "commitment" is a particularly inapt solution where, as here, thousands of lives are at stake. In fact, Congress rejected them almost three decades ago when it passed the National Traffic and Motor Vehicle Safety Act in 1966. As the Senate Committee Report stated:

> *The promotion of motor vehicle safety through voluntary standards has largely failed. The unconditional imposition of mandatory standards at the earliest practicable date is the only course commensurate with the highway death and injury toll.*[23]

The 1966 Congressional legislators were right. The historical path of automakers' voluntary efforts is paved with broken promises. From General Motors' promises in 1970 to voluntarily put air bags in all its vehicles by the mid-1970s (GM installed just 10,000 in model year 1974 and 1975 vehicles, and then discontinued the program), to Ford, DaimlerChrysler and GM's recent recanting of their widely publicized 2001 promises to voluntarily improve the fuel economy of their light trucks by 25 percent (withdrawn after the threat of Congressional action on fuel economy receded). "Voluntary" is often just another name for manufacturers' tactical maneuvers and delay.

Moreover, government reliance on voluntary "commitments" violates core principles of democratic accountability and transparency, because such voluntary agreements:

- Contain no mechanisms for accountability: If the voluntary proposal proves dangerously deficient, automakers shirk liability because there is no recourse for injured consumers, nor for the government to initiate a defect investigation or compel the industry to perform a recall;
- Involve closed, secret processes and meetings: The public, which is at risk, is shut out of the development of the proposal, which instead is designed in secret by industry working groups who are not subject to oversight, compliance with statutory requirements, responsibility for explaining the basis for their decisions, or judicial review of their decisions;
- Lack transparency: The public has no means to secure an independent evaluation of the quality of the industry's voluntary tests or standards. The public receives no verification that a particular vehicle actually complies with the industry's voluntary tests, as they do with government standards that are subject to public compliance testing and enforcement, and there is no vehicle sticker at the point-of-sale to indicate that a standard is met;
- Lack a baseline for safety: High-income purchasers, who can afford safety extras may be protected, but low-income purchasers remain vulnerable to cost-based decisions by manufacturers;
- Produce weak and non-binding results: Proposals are invariably weak because they represent the lowest common denominator among companies looking out for their own costs and product plans, and there is no obligation to install technology in compliance with the group standard, meaning that companies can change their minds at will and decide to withdraw any protection offered by the voluntary "standard."
- Lack any means of enforcement: Voluntary "commitments" are just that—voluntary and therefore not enforceable. Consumers and NHTSA have no legal recourse against a manufacturer's failure to meet the agreed-upon initiative. NHTSA cannot bring an enforcement action, force a statutory recall, or even influence a voluntary recall for failure to abide by the voluntary agreement. Industry group decision makers are not subject to oversight, compliance with stat-

utory requirements, responsibility for explaining the basis for their decisions, or judicial review of those decisions;

- Replete with Exemptions: Voluntary "commitments" usually have exemption clauses permitting manufacturers to opt out of "compliance" because of marketing considerations, costs, or for other reasons.
- Undermine Regulatory Agencies: Voluntary efforts often sideline agency involvement in safety policy by allowing willing agencies to defer or avoid regulation in a timely and vigorous manner.
- Discourages New Agency Research: Agency research likely will stop or be directed toward other areas in light of adopted industry voluntary commitments and industry research to support those agreements.
- Produces Limited Remedies: because voluntary "commitments" are developed and agreed to by industry they include little or no remedies for consumers in the event the standards are not met or are ineffective.

In fact, automakers latest round of voluntary "commitments" on compatibility is just an older, recycled campaign in updated clothing. In 1998, the auto industry promised the NHTSA Administrator Dr. Ricardo Martinez that it would make modifications to achieve safer designs, mainly by adjusting vehicle suspension, but the industry refused to provide any details of their plans. There is little evidence that any substantial design changes were made.

The House of Representatives should enact measures to address vehicle mismatch in crashes:

- A vehicle compatibility and aggressivity reduction standard addressing bumper height, weight and other compatibility characteristics.
- A consumer information program to rate vehicles according to aggressivity and compatibility in multiple-vehicle collisions.
- An upgrade of the side and frontal impact standards to ensure that vehicle design also protects occupants who are inside both the struck and striking vehicle.

Fixing the Needlessly Deadly 15-Passenger Van

There were about 500,000 15-passenger vans on the road as of July 2001.[24] Between 1990 and 2000, 864 occupants of these vans died in crashes, 424 of them in single-vehicle rollover crashes, producing a vehicle death rate that is far higher than it should be given the relatively small number of these vehicles that are on the road, as well as an extraordinarily high death rate in rollover crashes.[25] There is no question that 15-passenger vans are over-involved in single-vehicle rollover crashes compared to other passenger vehicles. From 1991 to 2000, 33 percent of passenger vehicles involved in single-vehicle, fatal accidents experienced a rollover, compared to 52 percent for 15-passenger vans involved in such crashes. *A shocking 81 percent of all 15-passenger van occupant fatalities occurs in single-vehicle rollover crashes.*[26]

Further, NHTSA has found that the number of occupants in a 15-passenger van has a large effect on the frequency of rollover in fatal crashes. In fatal single-vehicle crashes, cars with 10 or more occupants rolled over 85 percent of the time, compared to 38 percent of the time in those vans with fewer than 10 occupants and 28 percent of the time for those vehicles with fewer than five.[27]

The vans fall outside of the scope of many federal motor vehicle safety standards, such as roof crush, head restraints, braking systems and rollover warning labels. Under current law, these vans are not tested by the New Car Assessment Program (NCAP), so consumers have no idea of their crash or rollover ratings. Many innocent passengers have no idea that these vehicles are deadly, particularly when carrying more than 5 occupants.

In recent years, high-profile rollover crashes of 15-passenger vans have killed or injured many riders in crashes particularly notable for the high numbers of people hurt and the concentration and close association of those affected. A number of such crashes involved college sports teams and church groups, and finally caught the attention of the U.S. Department of Transportation's highway safety agency, NHTSA.

After conducting an inquiry into the problem, NHTSA issued a Consumer Advisory and Research Note in April 2001, and reissued another Consumer Advisory a year later in April 2002.[28] In its consumer warnings, NHTSA highlighted the riskiness of the vans. A few insurers of churches and schools are no longer selling policies to insure these vehicles and are raising the rates for existing policyholders.[29]

The National Transportation Safety Board (NTSB) also issued a safety report on November 1, 2002, with recommendations to address the safety hazards of the vans in letters directed to General Motors, Ford and NHTSA.[30] The NTSB recommends that NHTSA include 15-passenger vans in its pending plan for a dynamic rollover testing program and test these vehicles in crash tests as part of the agency's New Car Assessment Program, which publishes results by make and model for consumers. The NTSB further requested that NHTSA, in conjunction with the manu-

facturers, test and evaluate technological handling systems, particularly electronic stability control systems, which have potential to assist drivers in maintaining control of these rollover-prone vans.

The House should enact basic safeguards for 15-passenger vans:

- The inclusion of 15-passenger vans in all relevant safety standards for occupant protection and vehicle crash avoidance and in NHTSA's dynamic rollover testing program.
- The incorporation of ratings of 15-passenger vans into NHTSA's NCAP program
- Testing and evaluation of potential technological systems to assist drivers in controlling15-passenger van
- The inclusion of all 15-passenger vans used in commercial purposes in all relevant truck safety standards and regulations.

Making the road safer for America's children

Motor vehicle crashes are the single leading cause of death for children age 2 and every age 4 through 18.[31] During the 1990s, more than 90,000 children were killed and 9 million injured in motor vehicle crashes. Many of these children were harmed because they were improperly restrained, and many others were hurt because the vehicles they were riding in were not designed to properly protect them.

Unrestrained or incorrectly restrained children are at risk

Many children who are too large for child seats and too small for adult belts are strapped into adult belts or are left wholly unrestrained. A small percentage of these children are placed in booster seats that can slide or tip in a collision; are often installed incorrectly or simply incompatible with the family vehicle; are not regulated for children over 50 pounds; and are not crash-tested in vehicles, even though compatibility is a crucial issue for safety.

The current federal safety standard for child restraints was put in place in the early 1970s. It applies only to children who weigh less than 50 pounds, meaning that booster seats for larger children are completely unregulated and not required to meet safety tests. It is based on adult injury criteria never designed for children, and only frontal, not all, crash modes.

Due to conflicting and complex messages put out by the auto industry and NHTSA, parents too often do not know how to protect their child. Although it is dangerous to place a children under age 9 in an adult safety belt, 29 states require parents to place children in either a safety seat or an adult belt when a child reaches age 4.

Child restraint devices that address the "safety gap" were pioneered by researchers outside of the auto industry as far back as 1974. But instead of designing effective safety belts or child seats integrated into rear seats to accommodate children in the 4 to 8 age group, auto companies promoted aftermarket booster seats as the gap filler, despite their knowledge that the seats could be hazardous in collisions.

The terrible risk of vehicle backover

In 2002, the Center for Disease Control announced that 9,160 children are treated in U.S. emergency rooms every year following involvement in non-traffic, non-crash events related to vehicles.[32] The non-profit group, Kids and Cars, documented at least 154 deaths in 2003 due to non-traffic, non-crash events.

According to news reports gathered by Kids and Cars, 58 children were killed by being accidentally backed over, usually by family members, in 2002 and at least 72 were killed in 2003. SUVs, minivans and pickups have larger blind spots than do passenger cars and with the increase of these vehicles on the highway, and in the driveway, there is an increased likelihood that additional children will be accidentally run-over.

Although NHTSA recognizes that it is responsible for motor vehicle safety when a crash occurs off the public roadway, lacks a method to collect data, or an office in which these significant types of injuries and deaths are researched. And, even though numerous technologies exist that could greatly reduce the likelihood of backover incidents, no standards require them and few manufacturers offer them as standard equipment.

The House should enact crucial measures to improve child safety in and around vehicles:

- A backover avoidance study and assess technologies that let drivers know when a child is behind the vehicle.
- The beginning of a collection of basic data on the number and types of non-traffic vehicular deaths and injuries.
- The establishment of a state based incentive program that encourages states to enact laws mandating booster seat use for children too big for child safety seats.

- A new child-sized dummy for increased testing of how rollover and other crashes injure children.
- A report on technologies designed to prevent and reduce the number of injuries and deaths of children because of automatic windows.
- And a standard would require window switches be designed to reduce the accidental closing by children of power windows and issue performance-based regulations that child-safe switches or related technologies be designed to prevent accidental closing.

Additional important safeguards in the Senate-passed bill

Increasing safety belt use

NHTSA estimates that 12,144 lives were saved by safety belts alone in 2001, and wearing a safety belt reduces a person's risk of dying in a crash by 50 percent. Current law prohibits a regulation for an audible reminder longer than 8 seconds, though Ford and other companies have tested superior reminders. The safety provisions in the Senate-passed bill would allow new and innovative safety belt reminder systems that will increase belt usage.

Improving the frontal impact standard

Most occupant fatalities that occur on America's highways occur in frontal impact crashes. In 2002, 16,870 died when their vehicle was involved in a frontal crash.[33] Even though few of these crashes are head on into solid barriers, the only test NHTSA does to assess a vehicle's frontal impact safety is head-on into a solid barrier. The Senate-passed bill would require the improvement of frontal impact standards for passenger vehicles, including the evaluation of additional test barriers and different measurements of occupant head and neck injuries.

Enhancing the side impact standard

In 2002, 9,197 occupant fatalities were attributed to side-impact crashes.[34] As discussed above, the danger of being a passenger car occupant in a side impact crash with a light truck is extreme and these dangers only grow as the population of light trucks on the road increase. In October 1999, NHTSA granted a petition from Advocates for Highway and Auto Safety on improving side impact standards, but no rulemaking has occurred to date. This is despite a recent study showing that side air bags can reduce side impact crash fatalities by up to 50 percent.[35] The Senate-passed bill would assure an upgrade in the current standard to improve impact protection to passenger vehicle occupants as well as an update of new barriers and head and neck injury measurements.

Upgrading tire safety

In June, 2003, in response to directives in the 2000 TREAD Act, NHTSA issued a ruling updating safety performance standards for tires. However, counter to Congressional intent, NHTSA left serious holes in the updated standard. Despite the clear mandate, the new rule failed to adequately address tire strength and road hazard protection, or to establish minimum standards for bead unseating resistance and aging. The Senate-passed bill would upgrade the tire standards to respond to the TREAD directives and would increase tire resistance to bead unseating and aging.

Endnotes

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[9] The UCS Guardian & Guardian XSE: A Blue Print For A Better SUV. Washington: Union of Concerned Scientists, 2003. <http://www.suvsolutions.org/blueprint.asp>.

[10] Jayne O'Donnell, "Will more safety rules save many more lives?" USA Today, Feb. 25, 2004.

[11] Public Citizen v. Mineta, 340 F.3d 39, [get quote cite], (2nd Cir. 2003).

[12] According to the figures in the agency final rulemaking, a direct tire pressure monitoring system requirement would save between 79 and 124 lives a year, but would only cost $54 per

vehicle (not $90, as the article states). The cost per life saved would be $4.3 (not $5 million, as the article states). The shoddy, indirect system had even higher costs per life saved, $5.8 million, because it offers only very meager benefits.

[13] 68 Fed. Reg. at 67079

[14] NHTSA, Motor Vehicle Traffic Crash Injury and Fatality Estimates: 2002 Annual Report, July 2003.

[15] NCSA, Characteristics of Rollover Crashes, DOT HS 809 438, (Apr. 2002), at 14 and 20; See also "Registration Data for 1975-2001: Data Source" FHWA and Polk" provided by a NCSA researcher to Public Citizen on Feb. 6, 2003, (The rate of passenger car occupants who died in fatal rollover crashes declined 18.5 percent between 1991 and 2000 (from 4.32 to 3.52 deaths per 100,000 registered vehicles) while the rate of light truck occupants who died in fatal rollover crashes increased 36 percent between 1991and 2000 (from 7.55 to 10.27 deaths per 100,000 registered vehicles.).

[16] NHTSA, Motor Vehicle Traffic Crash Injury and Fatality Estimates: 2002 Annual Report, July 2003.

[17] The current standard requires a static test, in which the platen on the vehicle roof corner, above the A pillar, must bear one and a half times the vehicle's weight with the windshield intact.

[18] Brian Herbst, Stephen Forrest, Steven E. Mayer and Davis Hock, Alternative Roof Crush Resistance Testing with Production and Reinforced Roof Structures, 2002-01-2076, SAE 2002.

[19] Bradsher, Keith. High and Mighty: SUVs-The World's Most Dangerous Vehicles and How They Got That Way. New York: Public Affairs 2002, at 193 (Referring to Hans C. Joksch, "Vehicle Design versus Aggressivity," (April 2000), DOT HS 809 194. p. 40-42).

[20] Joksch, Hans C. "Vehicle Design versus Aggressivity," at 41. Further calculations contained in an electronic mail communication between Public Citizen and safety researcher Hans Joksch stated: "In 1996, 890 car occupants died in collisions with SUVs. If the risk in collisions with cars of the same weight had been half as high, as estimated at that time, 445 deaths would not have occurred if SUVs had been replaced by cars of the same weight." Email from Hans Joksch to Laura MacCleery of Public Citizen, on Feb. 24, 2003 (on file with Public Citizen).

[21] Bradsher. at 449, fn. 13 (Leaving aside SUVs and considering just the number of drivers killed per 5,000 crashes, in which a large car hits another car of any size, an average of 2.2 drivers die in large cars and 5.5 drivers die in the other cars that were truck. Together these numbers render a total of 7.7 deaths per 5,000 crashes. Because the large cars are heavier than most of the cars they hit, the drivers of the large cars tend to fare better. When looking at the crashes involving Explorers, on average only 1.2 Explorer drivers die when involved in the same number of collisions with cars. Compared to the 2.2 drivers who died in the large cars, the Explorers actually save a life. However, this is misleading because, doubling to 11 deaths. Therefore, on average 5.5 extra driver deaths occur in the struck cars. The combined death rate for drivers on both sides of the collision has now risen to 12.2 for collisions involving Explorers, compared with 7.7 when there were just large cars hitting the other cars.)

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[25] Id.

[26] Safety recommendation letter from National Transportation Safety Board to William Clay Ford, Jr., Chairman and Chief Executive Office, Ford Motor Company and Mr. G. Richard Wagoner, Jr., President and Chief Executive Officer, General Motors Corporation, Nov. 1, 2002, H-02-29.

[27] Id.

[28] See NHTSA Consumer Advisory, April 9, 2001, http://www.nhtsa.dot.gov/nhtsa/announce/press/2001/pressdisplay.cfm?year=2001&filename=ca-010409.html; W. Riley Garrott, "The Rollover Propensity of Fifteen-Passenger Vans," April 2001, NHTSA Research Note; NHTSA, NHTSA Repeats Rollover Warning To Users of 15-Passenger Vans, April 15, 2002, http://www.nhtsa.dot.gov/nhtsa/announce/press/pressdisplay.cfm?year=2002&filename=pr27-02.html.

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[32] CDC "Injuries and Deaths among Children Left Unattended in or Around Motor Vehicles," Morbidity and Mortality Report Vol. 51. No. 26. July 5, 2002.

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PREPARED STATEMENT OF THE ASSOCIATION OF INTERNATIONAL AUTOMOBILE MANUFACTURERS, INC.

The Association of International Automobile Manufacturers (AIAM) is a trade association representing 14 international motor vehicle manufacturers who account for 40 percent of all passenger cars and 20 percent of all light trucks sold annually in the United States. AIAM members have invested over $26 billion in U.S.-based production facilities, have a combined domestic production capacity of 2.8 million vehicles, directly employ 75,000 Americans, and generate an additional 500,000 U.S. jobs in dealerships and supplier industries nationwide. AIAM members include Aston Martin, Ferrari, Honda, Hyundai, Isuzu, Kia, Maserati, Mitsubishi, Nissan, Peugeot, Renault, Subaru, Suzuki and Toyota. AIAM also represents original equipment suppliers and other automotive-related trade associations.

AIAM appreciates the opportunity to offer its views regarding the need for additional or revised legislative authority regarding the programs administered by the National Highway Traffic Safety Administration (NHTSA). The programs administered by NHTSA are of significant, daily importance to virtually all Americans. In general, the agency's programs enjoy broad public support and support within the auto industry. This level of support derives to a significant extent from the agency's strong reliance in recent years on science and data analysis in determining policy direction and pursuing these policies in an objective, non-ideologically driven manner.

In this statement, AIAM will address the need for new legislation in the vehicle safety area, in certain narrow aspects of the fuel economy standards program, and in its programs for content labeling of motor vehicles.

MOTOR VEHICLE SAFETY

In September 2002, NHTSA announced five priority safety areas for in-depth staff review of possible mitigation measures: safety belt use, impaired driving, rollover mitigation, vehicle crash compatibility, and traffic records and data improvements. Building on that work, last year the agency announced a four-year priority plan for safety rulemaking and supporting research. NHTSA has developed this priority agenda in the vehicle safety area based on its analysis of which aspects of safety have the potential to provide the greatest public benefit in terms of reduction of fatalities and serious injuries from motor vehicle crashes.

AIAM fully supports the agency's approach of establishing its priorities on the basis of safety data, so as to target the areas with the greatest potential benefit for early action. NHTSA's approach reduces the likelihood that vehicle manufacturers will be forced to assign staff and budget resources to research and development activities with a limited safety benefit, which in turn helps assure that consumers will not confront higher vehicle prices resulting from such misallocation of resources.

To assist the agency in establishing appropriate priorities, Congress should fully fund the agency's research program. In particular, AIAM urges full funding for the agency's FARS and NASS crash databases and the planned, long-overdue updating of a comprehensive crash causation study. These data sources are critical to agency efforts to identify appropriate safety priorities. Congress would be hard-pressed to identify more effective investments of the taxpayers' money than these programs. Another research priority that should be fully funded is agency work to develop safety standards appropriate for new technology vehicles (e.g., fuel cell vehicles, fully electronic "by-wire" systems, etc.). Manufacturers are already developing designs and prototypes for such new technologies. Without knowing what standards will apply or how to interpret current standards in the context of the new technology, manufacturers will generally not be able to economically incorporate standards compliance into their designs.

We urge the Subcommittee to avoid the temptation to micromanage the agency's establishment of safety priorities and agendas, as has been done to a degree in the Senate version of highway reauthorization legislation, S. 1072. We see no indication that the agency has established inappropriate priorities or has failed to pursue those priorities aggressively. Should the Subcommittee find, in the course of its oversight of NHTSA's operations, that the agency strays from these priorities, it could act then to impose a set of mandates.

Although the vehicle safety provisions in the Senate bill have improved somewhat during the course of deliberations in that body, we still find substantial problems in the Senate approach. Our concerns lie in three areas—reordering of agency priorities, establishment of inflexible deadlines, and regulatory outcomes that are directed prior to agency assessment and research and public comment. Note, for example:

- It is our understanding that NHTSA has concluded that the planned upgrade to its side impact protection standard is by far its most significant near term rulemaking, in terms of potential safety benefits. Yet the Senate bill would prevent NHTSA from prioritizing that rulemaking, by piling on additional rulemaking requirements in the same time frame or in some cases ahead of the side impact requirement (e.g., Sec. 4152, general ejection mitigation and door lock standards; Sec. 4155, crash compatibility/aggressivity standards and consumer information program; Sec. 4156, rollover crashworthiness and resistance standards and frontal crash test upgrades including new test barriers and injury criteria; Sec. 4157, 15-passenger van standards and consumer information; Sec. 4158, tire standards upgrades beyond the recently completed upgrades and report on shearography analysis; Sec. 4159 seat belt reminder standard; Sec. 4173, report and rulemaking on testing of additional child test dummies, rulemaking, consumer information, and report to Congress on child safety in rollover crashes, and rulemaking on power windows.)
- The requirement in section 4155 for near term standard setting and new consumer information on crash compatibility/aggressivity would restrict the agency's flexibility to consider potentially more effective approaches. For example, the agency might well conclude that the best approach would be to rely on the industry's recently announced commitments to address the compatibility matter for the near term and to pursue more advanced approaches thereafter that could not be accomplished consistent within the bill's time frame (an early 2007 proposal).
- Section 4156 of the Senate bill would require near term rulemakings to adopt standards on rollover crashworthiness and rollover resistance. The agency has recently issued upgraded consumer information requirements relating to rollover, in response to a 2002 study by the National Academy of Sciences. See http://books.nap.edu/html/SR265/SR265.pdf. NHTSA has found that the consumer information approach is superior to rulemaking as a means of addressing the rollover propensity matter, and recent experience with NHTSA and the Insurance Institute for Highway Safety consumer information programs supports the effectiveness of a consumer information approach. The consumer information approach promotes improvement in all types of vehicles and has the potential to achieve quicker results at lower cost. We see no basis for the need to overlay a regulatory program on the newly enhanced consumer information program.
- The Senate has attempted to reduce the rigidity of the deadlines established in S. 1072 by adding a requirement for reports to Congress on any missed deadlines (Sec. 4160). Nevertheless, the inevitable effect of the bill is to lead NHTSA to take steps to comply with the deadlines in the law, even when doing so would limit opportunities to pursue alternatives with greater long term safety benefits.

We wish to emphasize that our opposition to the mandates in the Senate bill should not be read as an indication that we believe that all of the mandated rulemakings would be counter-productive. Indeed, many of the rulemakings are already in NHTSA's rulemaking priority plan. Rather, our principal concern is that the rigidity of the Senate approach may force NHTSA to delay action on high priority safety initiatives in order to address measures of less safety significance. The issue of priorities is real, not just theoretical. The testimony of the lighting supplier Hella at the March 18 hearing provides an example of NHTSA's need to set priorities due to limited resources. Hella described how NHTSA has been forced to delay rulemaking to clarify the lighting standard, as it focuses on matters with a greater potential safety pay-off.

NHTSA is also responsible for administering certain programs that are tangential to the agency's primary safety mission. Certain requirements under these programs have consistently been shown to impose costs but provide little or no benefit to consumers. These programs dilute the agency's focus and divert resources from its primary responsibilities. We believe that Congress should consider repealing these requirements. These requirements are discussed below.

AMERICAN AUTOMOBILE LABELING ACT (AALA)

AIAM has several concerns regarding the American Automobile Labeling Act (AALA), which is codified at 49 U.S.C. 32304. The statute requires that vehicles be labeled with information showing final assembly points and domestic content percentages.

The purpose of AALA is not explicitly stated in the legislation. NHTSA's regulations state that the purpose of the AALA program is "to aid potential purchasers in the selection of new passenger motor vehicles by providing them with information

about the value of the U.S./Canadian and foreign parts content of each vehicle, the countries of origin of the engine and transmission, and the site of the vehicle's final assembly." See 49 CFR 583.2. One could presume from the basic AALA requirements that the law was intended to make it easier for U.S. consumers who are so inclined to purchase vehicles that are assembled in the U.S. or North America or are produced using high levels of U.S./North American components, thereby promoting growth in the domestic economy. Keeping these potential purposes in mind, the information disseminated under AALA has several deficiencies:

- The information is not appropriately categorized by country. If the purpose of the law is to promote the sale of vehicles with high levels of U.S. content, Canadian content should not be combined with U.S. content. See 49 U.S.C. 32304(b)(1)(A). If the purpose of the law is to promote North American content consistent with NAFTA, Mexican content logically should be included with U.S. and Canadian content.
- Content that is added at the place of final assembly in the U.S. should not be excluded from the domestic portion of the content calculation. See 49 U.S.C. 32304(a)(15). Such content contributes fully to the U.S. economy.
- There should not be different content calculation rules for allied and outside suppliers. Domestic content is rolled up from 70 percent to 100 percent for outside suppliers, but not for allied suppliers. This discrepancy distorts the content percentages.
- In some instances, a car line may be produced in different countries (e.g., the U.S. and a foreign country), with vehicles from both sources being sold in the U.S. In that situation, AALA has been interpreted to require that the content percentages shown on the label must be an average of the two or more sources. As a result, the content percentages shown on the label are, in general, unrepresentative of any actual vehicle, potentially misleading consumers.[1]

By including Canadian content as domestic (or excluding Mexican content), ignoring the value of labor at the final assembly point in the U.S., establishing different calculation methodologies for "allied" and "outside" suppliers, and averaging content over multiple assembly plants, AALA misleads consumers as to the impact of the production of a particular vehicle on the U.S. economy.

Our second primary concern is that available information does not support the usefulness of the information disseminated under AALA. Based on the analysis presented in a NHTSA evaluation report regarding the program, one conclusion that is clearly justified is that the calculation and dissemination of the U.S./Canadian content percentages should be discontinued. In this regard, the Executive Summary of the report states that the agency's 1998 survey of 646 consumers found that "**not a single person explicitly stated that they had used the numerical parts-content score on the AALA label to comparison shop among make-models according to their percentages of U.S./Canadian parts content.**" (See http://www.nhtsa.dot.gov/cars/rules/regrev/evaluate/809208.html, emphasis supplied.) Calculation of the percentages is a task that imposes substantial burdens on vehicle manufacturers and suppliers, apparently to no useful end whatsoever. If the consumers surveyed for the evaluation are at all representative, there can be no basis for further dissemination of the content percentage information. Bluntly stated, no one cares about the percentages.

In his signing statement for the "Department of Transportation and Related Agencies Appropriations Act, 1993" that contained the original AALA provisions, former President Bush stated as follows:

> The bill contains an unnecessary and costly auto labeling requirement that may conflict with our international obligations on origin and labeling. In implementing this new requirement, the Department of Transportation will make every effort to provide accurate and meaningful information to consumers while minimizing costs. (See 28 Weekly Compilation of Presidential Documents 1869, October 12, 1992.)

Considering the invalidity of and the lack of consumer interest in the content percentages, eliminating the content labels is clearly in order.

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[1] NHTSA regulations provide an option for a manufacturer to include in an "explanatory note" at the bottom of the label an additional content percentage reflecting the applicable assembly plant. However, this option is generally not viable due to consumer confusion that would potentially result from having two different content percentages on the same label and additional administrative burden. See 49 CFR 583.5(e).

CAFE: SEPARATE FLEET REQUIREMENT

It is not our intention in this statement to raise the full range of possible legislative changes to the CAFE program that have been recommended by various parties. However, there is one issue that adversely affects U.S. employment and should be addressed by Congress in the near term. This issue involves the CAFE "two-fleet" requirement.

Under current law, manufacturers must divide their fleets of vehicles into two sub-fleets, based on the domestic content levels of those fleets. See 49 U.S.C. 32904(b). This requirement divides fleets using a 75 percent domestic content criterion, with each sub-fleet (vehicles having high U.S. content and those with low U.S. content levels) being treated as if produced by separate companies for standards compliance purposes. The requirement was originally intended (as part of the original CAFE statute) to assure that U.S.-based companies did not simply import large numbers of fuel-efficient vehicles from overseas in order to comply with standards. However, recent years' experience has shown that the principal effect of the provision has been to act as a disincentive to increasing U.S. parts content for foreign-based companies and to encourage U.S. companies to reduce the U.S. content of their less fuel-efficient models.

Congress commissioned a National Academy of Sciences study of the CAFE program in 2000.[2] The NAS Committee concluded that the two-fleet rule increases costs to consumers, is no longer justifiable, and should be eliminated. (See Report page 90.) In presenting its Findings and Conclusions, the Committee stated in Finding number 3 in the report[3] as follows:

> Certain aspects of the CAFE program have not functioned as intended The committee could find no evidence that the two-fleet rule distinguishing between domestic and foreign content had any perceptible effect on total employment in the U.S. automotive industry. (See page 111 of Report.)

In Recommendation number 4, the report states:

> Under any system of fuel economy targets, the two-fleet rule for domestic and foreign content should be eliminated. (See page 114 of the Report.)

AIAM concludes that, whatever basis there may have been originally for the two-fleet requirement, the requirement provides no current benefits and should be repealed.

CONCLUSION

In considering legislation to reauthorize NHTSA, AIAM urges the Subcommittee to avoid handcuffing the agency with an extensive set of mandated rulemakings and deadlines. A more appropriate approach is to recognize the value of the agency's current standard-setting agenda as part of a comprehensive approach that includes voluntary commitments by industry (such as the recent agreement to address vehicle crash compatibility) and consumer information programs (such as NHTSA's NCAP program and the program of the Insurance Institute for Highway Safety). So as not to divert agency and industry resources away from efforts to enhance vehicle safety, the Subcommittee should also consider provisions to eliminate regulations that impose burdens but provide no benefit, such as the domestic content label requirements. Finally, the Subcommittee should consider eliminating the CAFE "two-fleet" rule, which also imposes costs and may harm domestic employment, contrary to the original intent of Congress.

[2] See Conference Report on H.R. 4475, Department of Transportation and Related Agencies Appropriations Act, 2001, Report 106-940, as published in the Congressional Record of October 5, 2000, pp. H8892-H9004.

[3] "Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards," National Research Council, 2002.

WRITTEN COMMENTS BY THE

AMERICAN INTERNATIONAL AUTO DEALERS ASSOCIATION

BEFORE THE

HOUSE SUBCOMMITTEE ON COMMERCE, TRADE, AND CONSUMER PROTECTION

ON THE REAUTHORIZATION OF THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

MARCH 18, 2004

Mr. Buzz Rodland
2004 Chairman
American International Auto Dealers Association

Headquartered in Alexandria, VA, the American International Automobile Dealers Association (AIADA) is the only national lobbying force in the United States dedicated exclusively to representing the interests of America's 10,000 international nameplate dealerships. AIADA member dealers sell and service the following international nameplate brands: Acura, Aston Martin, Audi, Bentley, BMW, Ferrari, Honda, Hyundai, Infiniti, Isuzu, Jaguar, Kia, Land Rover, Lexus, Maserati, Mazda, Mercedes, MINI, Mitsubishi, Nissan, Porsche, Rolls Royce, Saab, Scion, Subaru, Suzuki, Toyota, Volkswagen and Volvo.

AIADA was founded in 1970 to increase awareness among the government and the public of the international nameplate automobile industry's value to the U.S. economy. International nameplate dealers – found in all fifty states and every congressional district – facilitate 500,000 American jobs and inject hundreds of millions of dollars into the national economy. Locally, AIADA member dealers contribute thousands of hours and tens of millions of dollars to various charities and deserving causes.

Our association continues to be primarily focused on trade related matters. However, as other pertinent issues arise that directly affect our dealer members, our association will act. The issue of auto safety is a high priority for AIADA, including the debate over sport utility vehicle (SUV) rollover.

Rollovers and resulting fatalities are of great concern to our members and the respective manufacturers of the vehicles they sell and service. A number of new technologies, including Electronic Stability Control (ESC) and Variable Ride-Height Suspension (VRHS) are becoming more widely available to help reduce the likelihood of rollover crashes. Furthermore, rollover air bag systems are being introduced in many SUVs.

In addition to the introduction of new technologies, vehicle safety information is available for all consumers. Efforts by the individual manufacturers and the National Highway Traffic Safety Administration (NHTSA) provide research and communications to the public so consumers can make informed decisions that has lead to reduced highway deaths and injuries.

Automobile manufacturers are making impressive strides in developing safety technologies and vast amounts of safety information readily available to the consumer. However, AIADA understands that one of the principal reasons for SUV rollover is due to driver error. Additional efforts need to be made to educate SUV drivers about the unique handling characteristics of their vehicle. According to NHTSA, 85 percent of fatal rollover crashes are single-vehicle crashes, suggesting that driver behavior played a significant role in the accident. The key then is driver education, and AIADA is confident that our member base can help in this department.

Automobile dealers are the final link in the chain of commerce for the manufacturer and distribution of automobiles: from the design of the automobile, through production, distribution, and finally the sale to the retail consumer. In the process of bringing automobiles from the drawing board to the customer, the dealer and dealership employees are where the "rubber hits the road" between the automobile industry and the motoring public. Automobile dealers can play a key role then to further educate their customers about the unique handling characteristics of sport utility vehicles.

Vehicle safety is an important consideration for a customer when buying a motor vehicle. One only needs to look at the advertising campaigns of most car companies to see that a vehicle's safety is one of the most important buying considerations for most consumers. Safety always factors into the consumers buying equation at my Toyota dealership in Everett, Washington. Dealers know that safety sells, and we pride ourselves in thoroughly explaining these safety features to the consumer.

According to the J.D. Power and Associates 2002 U.S. Automotive Emerging Technologies Study, among the 25 features measured, nine of the top 10 most desired features were designed to enhance vehicle or occupant safety. The study provides further evidence that consumers show considerably more interest in new safety-related features than in entertainment, comfort or convenience features.

AIADA looks forward to working with the National Highway Traffic Safety Administration and other appropriate government agencies to maximize the safety of America's motoring public.

For more information please contact Marianne McInerney or Matt Pinnell at 703-519-7800.

INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

May 3, 2004

The Honorable Cliff Stearns
Chairman
House Energy and Commerce Committee
Commerce, Trade, and Consumer Protection Subcommittee
2125 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Stearns:

At the National Highway Traffic Safety Administration (NHTSA) Reauthorization Hearing held by the House Committee on Energy and Commerce on March 18, 2004, Dr. David Pittle of Consumers Union submitted several technical papers that he claimed support the use of dynamic tests for roof strength. There is no question that, in general, dynamic tests should be preferred over static tests, but considerably more research is needed to develop repeatable dynamic rollover test procedures.

Rollover testing is considerably more complicated than barrier impact testing because of inherent unpredictabilities in rollover events. Several different types of dynamic rollover tests have been used in various research programs, but research tests do not need the same degree of repeatability that is necessary for tests in a federal motor vehicle safety standard.

Rollover test procedures that have been used are as follows:

- Vertical drop tests: As the name implies, a vehicle is dropped onto its roof at a specified angle. This test can be repeatable in a single facility, but differences in the impact surfaces at different facilities could influence results. There are no secondary impacts. The lack of vehicle rotation and lateral friction forces with the ground make this test a not-very-realistic simulation of dynamic rollover forces (SAE J996, Bahling 1990).

- Dolly tests: In these kinds of tests, a vehicle sits on a moving platform that stops suddenly, forcing the vehicle to slide off the dolly and roll over. This test is notoriously unrepeatable, even for the first impact (Orlowski 1985, Bahling 1990), and it is estimated to adequately represent the conditions of less than 1 percent of real-world rollovers (Parenteau 2003).

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- Controlled Rollover Impact System (CRIS): This test spins a vehicle on a rotisserie-like mounting on the rear of a moving tractor-trailer. The spinning vehicle is dropped on the ground. This test provides a more realistic first impact condition, and the first impact is repeatable; however, the number of rolls after the first impact is not. Roof intrusion measurements are not reliable due to the variable number of impacts. The space required to conduct such a test also is an issue (Cooper 2001, Carter 2002, Moffatt 2003).

- Jordan Rollover System (JRS): This is a new test that spins a vehicle to impact on a moving floor. This test also provides a more realistic first roll condition but does not allow for secondary impacts unless the vehicle is repositioned. The first impact location on the vehicle appears to be repeatable, but the published information does not offer any data on the repeatability of intrusion measures obtained in the test (Friedman 2003).

There are no data that demonstrate relationships between a vehicle's performance in any of these tests and injury risk in real-world rollover crashes. It is possible that a system like JRS eventually can be used to evaluate roof strength, but at this time there are no published data to suggest that improving the performance of vehicles in these tests will lead to a reduction in injury in rollover crashes. Nor do we know the variability of roof intrusion measures that would be obtained from these tests.

Rollovers are very complex and often multiple-impact crash events. The initial roll conditions and the experience of the vehicle during the first roof impact can have a dramatic effect on the likelihood of additional rolls and subsequent impacts. Two of the tests mentioned above (vertical drop and JRS) do not evaluate the vehicle for more than one impact at a time. Thus, although these tests apply dynamic forces to the roofs, they may not be appropriate for a dynamic standard. About half of passenger car occupants (and more than one-third of occupants of sport utility vehicles) who are involved in rollovers and who are seriously injured while in the vehicle or else ejected from the vehicle, have undergone two or more roof impacts (Digges 2003).

At this time it would be premature to require NHTSA to issue a dynamic rollover test to assess roof strength. Instead Congress should provide the agency with funds to enable it to thoroughly research this issue, including the precise role of roof strength in injury causation in rollover crashes.

Sincerely,

Brian O'Neill
President

Cc: The Honorable Jan Schakowsky

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2002-01-2076

Alternative Roof Crush Resistance Testing with Production and Reinforced Roof Structures

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SAFE, LLC

ABSTRACT

The government, automotive industry and scientific community are currently scrutinizing the adequacy of the FMVSS #216 roof crush standard in the United States. As a result of concern about the ability of FMVSS #216 to enforce reasonable protection to occupants in rollovers, The National Highway Traffic Safety Administration (NHTSA) has recently published a Request For Comments in the Federal Register regarding updating this standard[1]. The inverted drop test methodology is a promising alternative test procedure to evaluate the structural integrity of roofs and is being considered by NHTSA as a possible compliance test. Recent testing on many different vehicle types indicates that damage consistent with field rollover accidents can be achieved through inverted drop testing at very small drop heights. Drop tests matrices were performed on 9 pairs of vehicles representing the majority of personal transportation vehicle types. This paper offers several examples of post-production reinforcements to roof structures that significantly increase the crush resistance of the roof as measured by inverted drop tests. These modifications were implemented with minimal impact on vehicle styling, interior space and visual clearances. The results of these modifications indicate that roof intrusion protection can be enhanced by nearly an order of magnitude as roof crush was reduced by 44-89% with only a 1–2.3% increase in vehicle weight.

Research and testing indicates that the static vehicle roof crush resistance, as measured by the current FMVSS 216 test procedure, is highly dependent on glazing integrity and the angle of load application. Fractured or missing glazing and/or more lateral load applications, as typically seen in field accidents, significantly reduce the structural resistance capabilities of many automotive roof structures. Two tests are presented in which the vehicle roofs are shown to collapse significantly under their own weight when the glazing is removed and the vehicles are placed on the roofs at lateral angles beyond those described in FMVSS 216 or SAE J996.

INTRODUCTION

The automotive industry and researchers have used drop testing for years to evaluate roof strength. In the late 1960's, SAE developed a standardized procedure to perform full vehicle inverted drop testing. Many domestic and import auto manufacturers have utilized the inverted drop test technique as far back as the 1960's and 1970's to evaluate roof strength. The Enhanced Safety of Vehicles (ESV) projects in the 1970s had a design goal based upon performance of the vehicles in a two-foot drop. Mercedes-Benz continues to use inverted drop testing as one of their many standard crash tests and has recommended inverted drop tests in its Comments to the Docket regarding roof strength rulemaking. The National Highway Traffic Safety Administration (NHTSA) is currently evaluating inverted drop testing as part of an upgrade to Federal Motor Vehicle Safety Standard (FMVSS) 216 and has conducted and relied upon drop testing as part of their research.

DROP TESTING COMPARISON EXPERIMENTS

A stock vehicle was inverted and dropped from a predetermined height and orientation based upon damaged sustained by a similar vehicle in a real-world accident scenario.. Published methodologies were utilized in determining test conditions.[2,3] Initial drop conditions were from 12"-18" in height, 16-25 degrees of roll and 5-7 degrees of pitch. The stock drop test vehicles sustained roof damage consistent with those sustained by real-world rollover accident vehicles. A similar stock vehicle was structurally modified based on the deformation patterns and failure modes seen in the corresponding real-world accident vehicle and stock drop test vehicle. The modification methodologies are well-accepted practices in the industry, which have been published in previous research and/or incorporated in production vehicles. The basic approach was to close open section components, add internal reinforcements and/or void fill components with structural foam or epoxy. The modifications were limited to reinforcing the existing structure without significantly impacting the

interior compartment or exterior styling. Each modified vehicle was then subjected to the same drop test environment as the stock vehicle with differences in structural performances discussed.

MODIFICATION METHODOLOGY

The vehicles which were modified incorporated some or all of the following reinforcement techniques: doubling metal thicknesses of existing roof components, integral steel tubing/frame placed inside the vehicle's existing structure, rigid void filling of existing roof structures, and installation of a second roof panel. A brief description and production examples for the modification methodologies are provided below.

Increasing Structural Wall Thickness

Enhancements of the existing steel structure by doubling of the structural panels of the A-pillars, B-pillars, roof bows, side headers and front header was accomplished by adding second production panels purchased from the manufacturer. The additional metal components were mated to the appropriate structure and welded along the existing pinch weld. Stone used this technique in 1975 as a means of strengthening roof structures in a series of dolly rollover tests for Ford Motor Company. [4]

Internal Steel Reinforcements

The methodology of inserting tubular steel reinforcements inside of existing automotive roofs has been patented, published methodology and is currently implemented in production vehicles.[5,6] Mazda holds a patent, which specifically designates the insertion of a steel tube within the existing pillar, to create a structure with increased strength and rigidity without an increase in the pillar's dimensions.[7] The patent states that this technique is simple, highly reliable and low cost. BMW and Mercedes-Benz both employ this tubular steel reinforcement methodology as part of their rollover protection systems in their convertible vehicles. The steel frames used as reinforcements create integral rollbars or rollcages similar to that used in the production Porsche 911 Targa beginning in the early 1960's. Ford also adopted this methodology in the 1970's by producing an integral rollbar in the full size Bronco. The tubular steel frame approach is similar to the spaceframe technology employed in production General Motors vehicles such as the Fiero and Lumina Van as well as aluminum spaceframe in the Audi A8. The space frame consists of a strong underlying frame upon which the exterior panels are attached.

Void Filling Cross Sections

Many manufacturers including Infiniti, General Motors, Ford, Nissan and Mitsubishi use rigid void fillers as reinforcements in their production and prototype roofs. The Ford Falcon employs rigid composite fillers in its roof structure to increase roof strength performance. Several scientific articles detail the ability of rigid void fillers, such as polyurethane and epoxy-based foams, to increase peak force and energy absorption of automotive components.[8,9,10,11,12] The NHTSA used high strength steel and syntactic foam to reinforce a pickup truck roof subjected to dolly rollover testing in 1993.[13] Several Ford Motor Company articles discuss the structural enhancement characteristics of polyurethane and epoxy-based structural foams as it can be applied to automotive vehicle construction.[14,15,16] Foam filling has been proven to enhance automotive structures by increasing load capacity and energy absorption, reducing section collapse and minimizing the effects of stress risers.[17]

Double Panel Roofs

Double roof panels have been used extensively for several decades and continue to be used today. The Ford F-series, General Motors C/K and Dodge Ram pickups all have incorporated double panel roofs as part of their production roof designs over the years. The Ford and General Motors Experimental Safety Vehicles during the 1970's incorporated double panel roofs as part of their roof structures in order to withstand 2 foot inverted drop tests. Rigid polyurethane foam can be placed in between the two roof panels to provide panel adhesion and rigid spacing between the panels. This technique of improving roof strength by foam filling a double roof panel has been validated using inverted drop testing.[18,19]

DROP TEST COMPARISONS

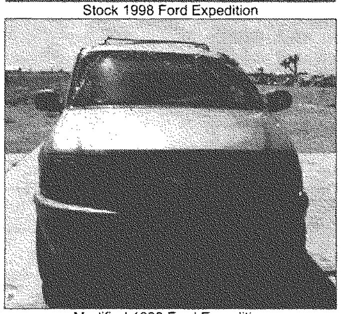
1998 Ford Expedition

One production and one modified 1998 Ford Expedition was inverted and dropped onto an instrumented load plate from a height of 12". A roll attitude of 25 degrees and a pitch attitude of 5 degrees were used. The modifications are detailed in table 1.

Table 1– Ford Expedition Modifications

Modification	Weight
Ford Production Sheet Metal Components • A-pillar inner (driver and passenger) • B-pillar inner (driver and passenger) • Side header inner (driver and passenger) • Front header inner • Two roof bows	31.2 lb.
Metal Straps At Front Header/A-pillar Interface	0.6 lb.
Second Inner Roof Panel • 4130 sheet steel 0.025" thickness	20.8 lb.
20 PCF Rigid Polyurethane Foam • Applied to B-pillar, side header, and front header cavities	22.2 lb.
30 PCF Rigid Polyurethane Foam • Applied to A-pillar cavities	6.5 lb.
10 PCF Rigid Polyurethane Foam • Applied between two roof panels	13.3 lb.
2 PCF Rigid Polyurethane Foam • Applied between two roof panels	5.9 lb.
Total	100.5 lb.

Stock 1998 Ford Expedition



Modified 1998 Ford Expedition

Figure 1 – Post Drop Test Photographs

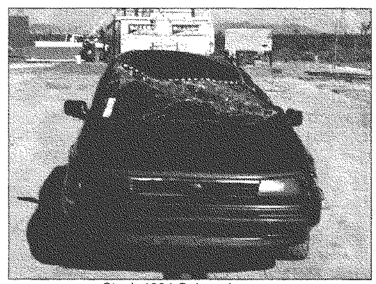
The stock vehicle sustained maximum residual crush of 12.75" and produced a peak dynamic roof crush load of 12,832 lb. The modified vehicle sustained a maximum residual crush of only 5.3", a reduction of 58%, and produced a maximum peak roof crush resistance load of 21,127 lbs., an increase of 65% (see Figure 1). These modifications were accomplished with a weight penalty of 105 lbs. or 2.0% of the approximate 5200 lbs. test vehicle weight.

1991 Subaru Legacy

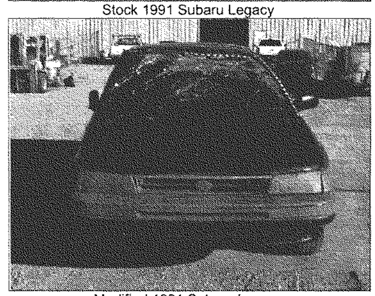
One stock and one modified 1991 Subaru Legacy Sedan was inverted and dropped onto an instrumented load plate from a height of 12". A roll attitude of 25 degrees and a pitch attitude of 5 degrees were used. The modifications are detailed in table 2.

Table 2– Subaru Legacy Modifications

Modifications	Weight
Steel Tubing Frame • 4130 Steel, 1" diameter, 0.120" wall thickness • Welded together to form continuous frame within existing structures	+35.2 lb.
Steel Plate • Cold rolled steel, 0.125" thickness • Welded to A-pillar inner and at tubing intersections	+4.4 lb
Steel Sheet • 4130 Steel, 0.025" thickness • Welded to existing roof and steel tubing frame creating a second roof panel • Welded to B-pillar and B-post inner	+9.0 lb.
30 PCF Rigid Polyurethane Foam • Applied to A- and B-pillar cavities	+7.3 lb.
10 PCF Rigid Polyurethane Foam • Applied between roof panels, side header, front header • Applied to the base of the A-post and B-post cavities	+14.9 lb.
OEM Sheet Metal Removed	-6.4 lb.
Total	64.4 lb.



Stock 1991 Subaru Legacy



Modified 1991 Subaru Legacy

Figure 2 – Post Drop Test Photographs

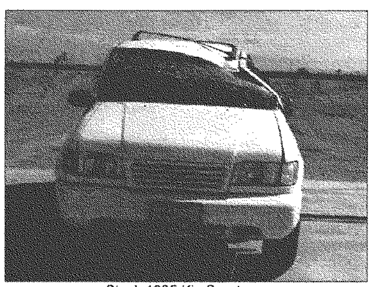
The stock vehicle sustained maximum residual crush of 12.1" and produced a peak dynamic roof crush load of 5,068 lb. The modified vehicle sustained a maximum residual crush of 1.9", a reduction of 84%, and produced a maximum peak roof crush resistance load of 15,768 lbs., an increase of 211% (see Figure 2). These modifications were accomplished with a weight penalty of 64.4 lbs., or 2.1% of the approximate 3040 lbs. test vehicle weight.

1995 Kia Sportage

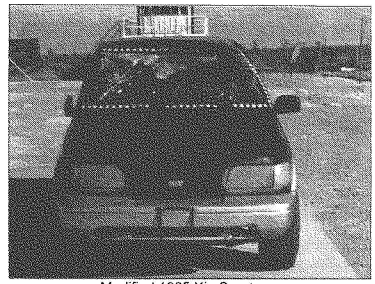
One stock and one modifed 1995 Kia Sportage was inverted and dropped from a height of 12". A roll attitude of 25 degrees and a pitch attitude of 5 degrees were used. The modifications are detailed in table 3.

Table 3– Kia Sportage Modifications

Modifications	Weight
Steel Sheet • 4130 Steel, 0.025" thickness • Welded to existing front header	+ 3.4 lb.
30 and 20 PCF Rigid Polyurethane Foam • Applied to front header, side header and B-pillar cavities	+ 18.3 lb.
Simpson Epoxy • Density of 87 lb/cubic foot • Applied to A-pillar	+ 8.5 lb.
Closed Box Section Production Roof Bow	+ 4.0 lb.
OEM Sheet Metal Removed	-1.4 lb.
Total	32.8 lb.



Stock 1995 Kia Sportage



Modified 1995 Kia Sportage

Figure 3 – Post Drop Test Photographs

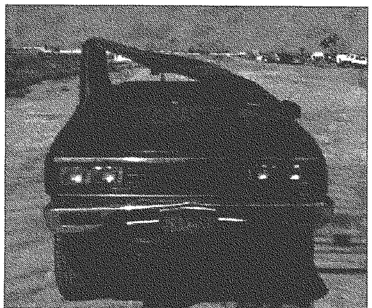
The stock vehicle sustained maximum residual crush of approximately 9.5". The modified vehicle sustained a maximum residual crush of 3.3", a reduction of 65% (see Figure 3). These modifications were accomplished with a weight penalty of 32.8 lbs. or less than 1% of the approximate 3400 lbs. test vehicle weight.

1985 Nissan Kingcab Pickup

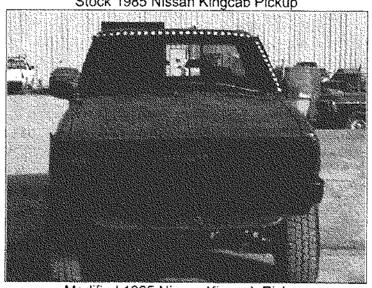
One stock and one modified 1985 Nissan Kingcab Pickup was inverted and dropped from a height of 12". A roll attitude of 25 degrees and a pitch attitude of 5 degrees were used. The modifications are detailed in table 4.

Table 4– Nissan Kingcab Pickup Modifications

Modification	Weight
Steel Tubing • 4130 Steel, 1" and 1.25" diameter, 0.120 wall thickness • Welded together to form continuous frame inside existing structures	59.6 lb.
30 PCF Rigid Polyurethane Foam • Applied to A-pillar cavities	3.2 lb.
20 PCF Rigid Polyurethane Foam • Applied to B-pillar, side header, and front header cavities	7.5 lb.
10 PCF Rigid Polyurethane Foam • Applied to A-post and B-post cavities	2.1 lb.
Total	72.4 lb.



Stock 1985 Nissan Kingcab Pickup



Modified 1985 Nissan Kingcab Pickup

Figure 4 – Post Drop Test Photographs

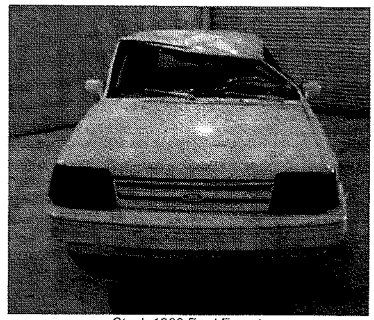
The stock vehicle sustained maximum residual crush of 15.9". The modified vehicle sustained a maximum residual crush of 1.8" for a reduction of 89% (see Figure 4). These modifications were accomplished with a weight penalty of 72.4 lbs. or 2.1% of the approximate 3472 lbs. test vehicle weight.

1989 Ford Escort

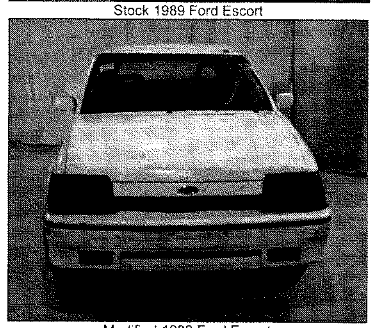
One stock and one modified 1989 Ford Escort was dropped from a height of 12". A roll attitude of 25 degrees and a pitch attitude of 5 degrees were used. The modifications are detailed in table 5.

Table 5– Ford Escort Modifications

Modification	Weight
Steel Tubing • 4130 Steel, 1" diameter, 0.120" wall thickness • Welded together to form continuous frame inside existing structures	+45.7 lb.
Plate Steel • Mild Steel, 0.25" and 0.125" thick • Use to form gussets at the intersections of the steel tubing and plates at bottom of A and B-posts and kicker to rear wheel wells	+4.4lb.
Sheet Metal • 4130 steel, 0.025" thick • Applied to interior portions of structure that were removed to accommodate the steel tubing as well as over front header	+5.1 lb.
OEM Sheet Metal Removed	-9.0 lb.
20 PCF Rigid Polyurethane Foam • Applied to B-pillar, A-post, B-posts, front header and side header cavities	+11.7lb.
30 PCF Rigid Polyurethane Foam • Applied to the A-pillars	+1.9 lb.
Total	+59.1 lb.



Stock 1989 Ford Escort



Modified 1989 Ford Escort

Figure 5 – Post Drop Test Photographs

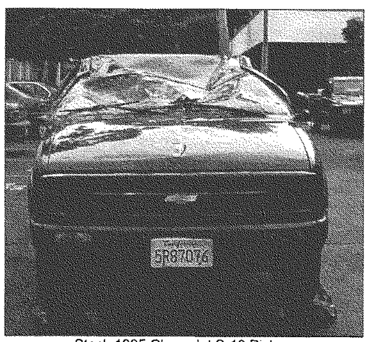
The stock vehicle sustained maximum residual crush of 7.4". The modified vehicle sustained a maximum residual crush of 1.5", a reduction of 80% (see Figure 5). These modifications were accomplished with a weight penalty of 59.1 lbs. or 2.3% of the approximate 2530 lbs. test vehicle weight.

1995 Chevrolet S-10 Pickup

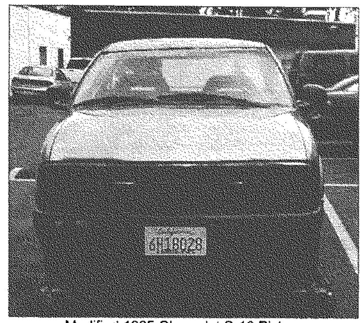
One stock and one modified 1995 Chevrolet S-10 Pickups was inverted and dropped from a height of 12". A roll attitude of 25 degrees and a pitch attitude of 5 degrees were used. The vehicles were subsequently dropped again on the opposite (driver's) side from a height of 0", a roll attitude of 25 degrees and a pitch attitude of 5 degrees. The modifications are detailed in table 6.

Table 6– Chevrolet S-10 Pickup Modifications

Modification	Weight
Steel Tubing • 4130 Steel, 1.25" and 1.125 diameter, 0.095" wall thickness • Welded together to form continuous frame inside existing structures	+27.8 lb.
Plate Steel • Mild Steel, 0.25" and 0.125" thick • Use to form gussets at the intersections of the steel tubing and plates at interface of A-pillar/post and floor	+8.5 lb.
Sheet Metal • 4130 steel, 0.025" thick • Welded into form inner panels at the side and front headers	+1.3 lb.
OEM Sheet Metal Removed	-7.3 lb.
20 PCF Rigid Polyurethane Foam • Applied front and side headers	+7.3 lb.
Total	+37.6 lb.



Stock 1995 Chevrolet S-10 Pickup



Modified 1995 Chevrolet S-10 Pickup

Figure 6 – Post Drop Test Photographs

The stock vehicle sustained maximum residual crush of 10.5". The modified vehicle sustained a maximum residual crush of 1.5", a reduction of 86% (see Figure 6). These modifications were accomplished with a weight penalty of 37.6 lbs. or 1.1% of the approximate 3580 lbs. test vehicle weight.

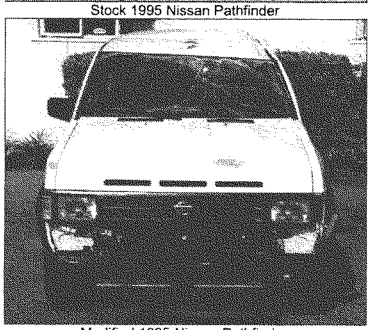
1995 Nissan Pathfinder

One stock and one modified 1995 Nissan Pathfinder was dropped from a height of 18". A roll attitude of 20 degrees and a pitch attitude of 5 degrees were used. The modifications are detailed in table 7.

Table 7– Nissan Pathfinder Modifications

Modification	Weight
Metal Strapping • 4130 Steel, 0.080" thick, 1" or 1.5" in width cut to fit the structures • Applied to A-pillars, B-pillar, front and side header inner portions	13.8 lb.
Roof Rib or bow	1.4 lb.
Second Roof Panel • Mild steel, 0.050" thick	34.0 lb.
Epoxy • Applied to the internal cavities of the A-pillar	4.5 lb.
20 PCF Rigid Polyurethane Foam • Applied to the B-pillar, front and side header cavities	11.2 lb.
6 PCF Rigid Polyurethane Foam • Applied to the between the two roof panels	7.5 lb.
Total	72.4 lb.

Stock 1995 Nissan Pathfinder



Modified 1995 Nissan Pathfinder
Figure 7 – Post Drop Test Photographs

The stock vehicle sustained residual crush of 11". The modified vehicle sustained residual crush of 2", a reduction of 81% (see Figure 7). These modifications were accomplished with a weight penalty of 72.4 lbs. or 1.9% of the approximate 3900 lbs. test vehicle weight.

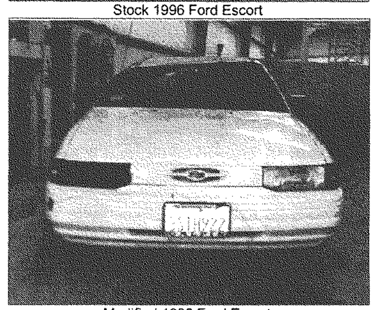
1996 Ford Escort

One stock and one modified 1996 Ford Escort was dropped from a height of 18". A roll attitude of 16 degrees and a pitch attitude of 7 degrees were used. The modifications are detailed in table 8.

Table 8– Ford Escort Modifications

Modification	Weight
Steel Tubing • 4130 Steel, 1" and 0.75" diameter, 0.083" wall thickness • Welded together to form continuous frame inside existing structures	+24.8 lb.
20 PCF Rigid Polyurethane Foam • Applied to A-pillar/A-post intersection, top of B-pillar and front/side/A-pillar intersection	+1.5 lb.
Total	+26.3 lb.

Stock 1996 Ford Escort



Modified 1996 Ford Escort
Figure 8 – Post Drop Test Photographs

The stock vehicle sustained residual crush of 6.3". The modified vehicle sustained residual crush of 3.5", a reduction of 44% (see Figure 8). These modifications were accomplished with a weight penalty of 26.3 lbs. or 1.1% of the approximate 2425 lbs. test vehicle weight.

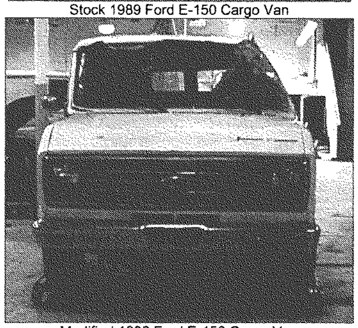
1986-1989 Ford E-150 Cargo Van

One stock 1989 Ford E-150 cargo van and one modified 1986 Ford E-150 cargo van was inverted and dropped from a height of 17". A roll attitude of 40 degrees and a pitch attitude of 0 degrees were used. The modifications are detailed in table 9.

Table 9– Ford E-150 Cargo Van Modifications

Modification	Weight
Steel Tubing • 4130 Steel, 2" diameter, 0.120" wall thickness • Bent to form roll bar hoop inside existing structure at the B-pillar	+40.0 lb.
Plate Steel • Mild Steel, 0.25" thick • Use to form gussets at the intersections of the steel tubing and plates at interface of B-post and floor	+6.4 lb.
OEM Sheet Metal Removed	-7.4 lb.
20 PCF Rigid Polyurethane Foam • Applied A-pillars and front/side headers	+14.5 lb.
Total	+53.5 lb.

Stock 1989 Ford E-150 Cargo Van



Modified 1986 Ford E-150 Cargo Van

Figure 9 – Post Drop Test Photographs

The stock vehicle sustained maximum residual crush of 12.6". The modified vehicle sustained a maximum residual crush of 4.7", a reduction of 63% (see Figure 9). These modifications were accomplished with a weight penalty of 53.5 lbs. or 1% of the approximate 5635 lbs. test vehicle weight.

HIGH ANGLE AND GLAZING EXPERIMENTS

Many FMVSS 216 static roof crush tests have significant decreases in resistance when the glazing (windshield side glass or rear glass) fractures. The FMVSS 216 test can give a misleading representation of a vehicle's ability to resist crush in a real world accidents since rollover events often involve multiple impacts during which the glazing can be compromised. Also, FMVSS #216 calls for testing vehicles in a best-case scenario in which all windows are closed. Investigation of real world rollovers makes clear that glazing can be compromised early on in a rollover accident during which the vehicle may sustain many contacts. Examination of field accident damage patterns and a study by General Motors indicates that rollovers often impart loads at a higher roll angle than the 25 degrees defined by FMVSS 216.

In addition to the drop tests described previously, additional roof loading tests have been performed to assess a test vehicle's roof crush resistance capability when subjected to higher load angles and compromised glazing. Mathematical analysis indicates that the test vehicles roof crush resistance under these test conditions would be at or below that of their own weight.

1989 Ford Escort

An inverted 1989 Ford Escort was placed with its driver's side A-pillar in contact with the ground, at a roll attitude of 37.5 degrees and a pitch attitude of 5 degrees. The vehicle's windshield had been cut out prior to the test. The overhead supports were then released and the vehicle's roof structure was subjected to the inertial load of the vehicles weight only. This resulted in the roof structure sustaining 5.4" of residual crush (see Figure 10) under the vehicles 2537 lb. test weight.

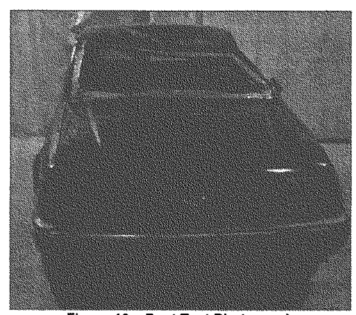


Figure 10 – Post Test Photograph

1992 Chevrolet Suburban

An inverted 1992 Chevrolet Suburban was suspended by a chain hoist and lowered onto an instrumented load plate at a roll attitude of 36 degrees and a pitch attitude of 16 degrees, Figure 11. A foam representation of the GM "Non-Encroachment Zone" [20] was strapped into the passenger seat using nylon webbing. The vehicle was manually lowered onto the load plate to observe whether the roof structure would support the weight of the vehicle. The test weight of the vehicle was 6019 lbs. The vehicle was unable to resist its own weight and crushed approximately 8" while being lowered. As the roof intruded into the "Non-Encroachment Zone", this test was stopped. The load plate indicated the roof structure was only able to resist crush with a maximum load of 4424 lbs.

A second test with this same vehicle was performed by lifting the inverted vehicle 6" off the ground and orienting it at a roll attitude of 36 degrees and a pitch attitude of 0 degrees. The vehicle was then allowed to drop in free fall to the ground in order to induce damage seen in a similar real-world accident vehicle. The damage sustained by the vehicle through both tests is depicted in Figure 12.

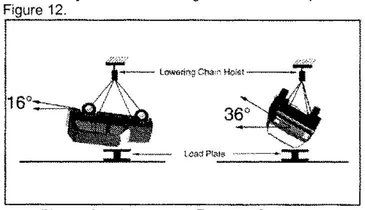


Figure 11 – Load Plate Test Configuration

Figure 12 – Post Test Photograph

CONCLUSIONS

- Inverted drop tests of 12"-18" can produce roof crush of 6.3" - 15.9" in typical current production vehicles.
- Simple modifications reduced roof intrusion to 1.5" – 5.3" under comparable drop test conditions. Roof crush reductions of 44%-89% are documented when compared with the production vehicle tests.
- Tested modifications were accomplished at weight penalties of 26 – 101 lbs. or 1.0 –2.3 % of vehicle test weights.
- Many current vehicle roof designs are significantly weaker when loaded at high angles and/or without glazing installed and intact. Under such conditions, two production vehicles were seen to crush under their own weight, demonstrating a strength-to-weight ratio less than 1. The FMVSS #216 performance criterion establishes a 1.5 strength-to-weight ratio.

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ABSTRACT

To date, the most commonly used rollover test device has been the rollover dolly described in the SAE J2114 recommended practice, which is commonly referred to as the "208 rollover dolly." However, for a number of reasons, the rollover dolly has never been accepted as a standard for rollover testing. One of the primary limitations of the rollover dolly has been the controllability of the first roof-to-ground impact. A new rollover test device, known as the Controlled Rollover Impact System (CRIS), was presented at the SAE Congress in March 2001. This device allows the roll, pitch, and yaw angles, roll rate, translational velocity, and drop height of the vehicle to be specified for the first roof-to-ground impact.

One objective of the current study was to compare the vehicle dynamics produced by each test device using an Econoline-350 van as the test vehicle. The first test was conducted on the rollover dolly with the van being released into a passenger side leading roll at 88.5 kph (55.3 mph). In order to provide a reasonable basis for device comparison, the initial conditions in the CRIS test were determined by post-test analysis of the first right side roof-to-ground impact in the rollover dolly test. Thus, the CRIS test was conducted with a second van at zero initial pitch and yaw angles, translating at a speed of 82.1 kph (51 mph), an initial roll rate of 149 deg/sec, a drop height of 5 inches, and impact with the ground at a 133 degree roll angle. The observed vehicle dynamics demonstrated a dramatic difference between the two test devices given similar initial conditions of the first roof-to-ground impact.

The other objective of this study was to quantify the differences in accelerations observed at the vehicle's center of gravity (CG) versus the roof-rails during roof-to-ground impact. To accomplish this objective, biaxial accelerometer sets were placed on both sides of the vehicle at the intersection of the roof-rail and each pillar, along with a triaxial accelerometer at the CG. The results suggest that, during roof-to-ground engagements, the environment near the roof-rails is much more severe, in terms of acceleration, than that observed at the vehicle's center of gravity.

INTRODUCTION

For many years, attempts have been made by the automotive industry and the Federal Government to develop a realistic and repeatable dynamic rollover test procedure. In fact, some of the earliest rollover test work that the authors are aware of involved rolling Model-A Fords and Jeeps down a hill. Subsequently, various manufacturers used ramp rollovers for a short period of time (SAE J857). The rollover dolly procedure, currently described in SAE J2114, was developed following the use of ramp rollover procedures. Additionally, specialized rollover procedures have been reported by various authors, such as Cooperrider et al. [1, 2], Habberstad et al. [3], and Thomas et al. [4].

The first published efforts to assess the predictability and repeatability of a rollover procedure were the Malibu 1 and Malibu 2 studies [5, 6]. Both of these studies examined rollover tests conducted using the rollover dolly with essentially identical vehicles and initial conditions. In the broadest sense, these studies demonstrated that even with the strictest control of initial conditions it was not possible to predict the vehicle dynamics. The Malibu studies provided important information on occupant kinematics during rollovers. Specifically, the Malibu series showed that interior occupants, in the form of test dummies, tend to move toward the roof-rails during the course of a roll. It was noted that this general motion had the potential to place the occupants head on the roof-rail during roof-to-ground impacts. Large dummy neck loads were a common result of this head placement.

To date, no single dynamic rollover test procedure has been found to yield predictable and repeatable vehicle dynamics. Recently, Cooper et al. [7] described a new and promising device known as the Controlled Rollover

Impact System (CRIS). This test device has the potential to produce predictable and repeatable rollover dynamics. A reasonable first step in evaluating the capabilities of this new device is to compare it with the current *de facto* rollover test device, namely the rollover dolly. Thus, one objective of this study was to examine and compare the vehicle dynamics produced by both devices using similar vehicles and initial conditions.

An issue that has lingered since the publication of the Malibu series has been: how does the occupant environment at, or near, the roof rail during a roof-to-ground engagement compare to the environment near the CG? Up to this point, the accelerations sustained by a vehicle in a rollover test have primarily been recorded at the CG. No information has been published concerning the accelerations experienced by the roof-rails during roof-to-ground impacts. Therefore, the other objective of this study was to measure accelerations at the roof-rails so that the environment near the roof-rails could be compared to the environment near the vehicle's CG.

MATERIALS AND METHODS

TEST VEHICLES – The 1999/2000 Ford Econoline-350 15-passenger van was used in both tests. Each vehicle was equipped with an automatic transmission, power steering, power brakes, and air conditioning. Both vans had overall lengths of 5,892 mm (232 inches), 3,505 mm (138 inch) wheelbases, and weighed approximately 28,000 N (6,300 lbf) in the tested condition.

No special vehicle modifications were made to the van used in the dolly test. However, the engine, transmission, and body were rigidly secured to the frame for the CRIS test. Additionally, chains were attached from the frame to the "axles" in the CRIS van to limit the travel beyond the maximum extension of the shocks. There was no restriction on the compression travel of the suspension. Securing the engine, transmission, and body to the frame as well as limiting the suspension travel was necessary to minimize the dynamic loads produced during the balancing procedure described below.

DATA COLLECTION – A crashworthy instrumentation and data acquisition system was used to collect acceleration time histories for each of the rollover tests. Data acquisition and subsequent processing were performed in accordance with the SAE J 211-1. Accelerometer data was acquired using a 2 kHz anti-aliasing filter and a 10 kHz per channel data acquisition rate.

The accelerometer configuration was the same for both the dolly test and the CRIS test. Accelerations at the CG were measured using three 100-g model 2262A-100 Endevco accelerometers mounted in an aluminum canister. This triaxial accelerometer canister was oriented to sense fore/aft, lateral, and vertical accelerations using the standard SAE sign convention of forward, right and down as described in the SAE J1733. Biaxial accelerations at the A, B, & C-pillar/roof-rail intersections were measured on both sides of the vehicle using damped 1000-g Entran accelerometers, model EGAX 1000, mounted in an aluminum block. Each biaxial accelerometer package was installed to sense lateral and vertical accelerations according to the standard SAE sign convention. Figure 1 is a photograph that depicts the locations of the accelerometers mounted on the left side roof rail. To the authors' knowledge this is the first time such an accelerometer configuration has been demonstrated in the literature.

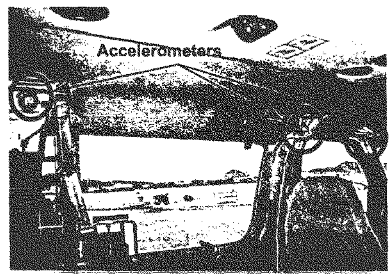

Figure 1: Driver's side roof rail accelerometers mounting positions. Accelerometers were mounted in similar positions on the passenger's side roof rail.

Vehicle roll and yaw rates were not measured in the dolly test. In the CRIS test, vehicle roll rate was measured using a Systron Donner solid-state inertial sensor, model QRS14-01000-102 mounted at the CG. The yaw rate of the van was measured using a Systron Donner solid-state inertial sensor, model QRS11-0020-200, and was mounted adjacent to the roll rate sensor.

The dolly rollover test was photographically documented with two panning high-speed film cameras (nominal frame rates of 500 frames per second) and panning and ground-based real-time video cameras. Two ground-based panning high-speed film cameras, four ground-based high-speed film cameras, two trailer mounted high-speed film cameras, and two panning real-time video cameras documented the vehicle dynamics in the CRIS test. The film cameras in the CRIS test were operated at a nominal frame rate of 300 frames per second.

In the CRIS test there was an inherent uncertainty in the area of first contact between the roof rail and the ground that was dependent on the vehicle roll rate, drop height, and translational velocity. Thus, the panning cameras were spaced 130 feet apart and 90 feet back from the centerline of the tow vehicle, with the first camera 50 feet beyond the first possible contact area. The four ground-based high-speed film cameras were positioned perpendicular to the initial path of the van with

overlapping fields of view. They were spaced 50 feet apart and 72 feet back from the centerline of the tow vehicle, with the first camera 25 feet beyond the first possible ground contact.

DOLLY TEST – The dolly test was conducted at Exponent's Test and Engineering Center in Phoenix, Arizona. The vehicle was configured for a passenger-side leading roll with the dolly platform at a 23–degree roll angle (Figure 2). The dolly and van were accelerated to a speed of 88.5 kph (55.3 mph) at which point the dolly was rapidly decelerated allowing the van to trip off the dolly onto a smooth concrete surface.

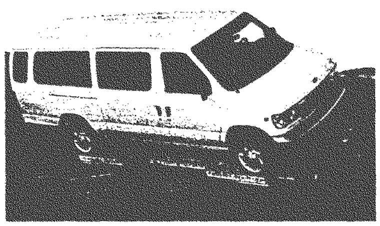

Figure 2: Still photograph of the E-350 van positioned on rollover dolly test.

CRIS TEST – The CRIS test was also conducted at Exponent's Test and Engineering Center in Phoenix, Arizona. The specifications and capabilities of the CRIS test device have been previously described by Cooper et al. [7].

Custom mounting fixtures were attached at the front and rear as shown in the still photograph of Figure 3. These mounting fixtures were bolted to a mating shaft assembly that allowed the van to be attached to bearings and spun about a prescribed roll axis while being suspended above the ground.

Prior to the test, dynamic balancing was performed on the van using the stationary vehicle balancing structure shown in Figure 4. Dynamic balancing was conducted by adjusting the location of the mounting fixture pivot points so that the van would spin about its principal roll axis. A balanced van allowed controllability of the vehicle's roll rate, minimized trailer jounce, which affects drop height, and provided for a clean release from the test fixture.

Figure 3: Still photograph of E-350 van with mounting fixtures attached at the front and rear.

Figure 4: Still photograph of the E-350 van mounted on the rigid test bed during the dynamic balancing process.

The dynamic balancing of the van resulted in the principal roll axis being 30.5 inches above the ground at the B-pillar cross section, as indicated in Figure 5A. This scaled drawing indicates that the exterior roof rail at the B-pillar cross-section was 59.5 inches from the roll axis and a line from the roll axis to that point was 59 degrees above the horizontal. It is clear from this diagram that the minimum height to clear the ground is governed by the exterior dimension at the van's roof-rails.

The drop height for a CRIS test is defined as the distance the vehicle center of mass falls from release to first contact with the ground. The orientation of the van at release is depicted in Figure 5B. Figure 5C illustrates the orientation at first contact with the ground. The difference in the center of mass height from release to initial contact was the drop height, which was 5 inches for the test conducted in this study.

With dynamic balancing complete and the roll axis established, the van was transferred to a custom-built test fixture cantilevered on the rear of a flatbed trailer (Figure 6 and Figure 7). The truss arms of the test fixture supported the vehicle above the ground and were independently adjusted to position the van at the desired yaw and pitch attitudes as well as provide for the desired drop height.

A Class-8 tractor was used to accelerate the CRIS fixture to the desired translational velocity, while a separate control system accelerated the vehicle on the fixture to the desired roll rate. An indexing wheel and sensor triggered the synchronous release of the van from its fore and aft mountings once the desired translational and rotational velocities reached steady

state. The roll angle at release was set to account for roll rate and time to fall the desired drop height.

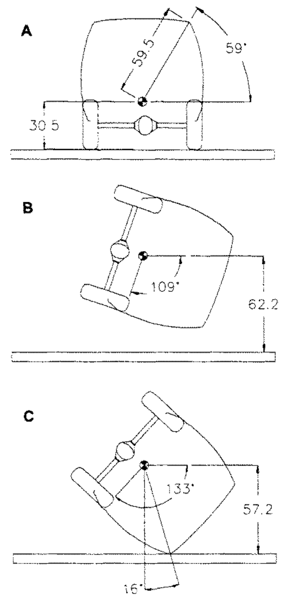

Figure 5: Scaled diagrams of the E-350 van cross-section at the B-pillar viewed from the rear. (A) Represents the van configuration after dynamic balancing. (B) Represents the orientation of the van at release from the CRIS fixture. (C) Represents the orientation of the van at initial contact. Linear dimensions are in inches.

In this CRIS test, the van was translating passenger side leading at 82 kph (51 mph) with a constant clockwise roll rate of 149 deg/sec (target was 150 deg/sec). The van was released from the fixture and fell approximately 127mm (5 inches) before the right side roof rail contacted the asphalt surface. Based on the review of the high-speed film, the van contacted the ground at a clockwise roll angle of 133 degrees (target roll angle was 135 degrees). The roll rate, translational velocity, and roll angle at impact were specified based upon analysis of the first ground engagement of the right side roof rail in the dolly test. The drop height was selected to provide sufficient clearance between the ground and roof-rail during the fixture's acceleration to the desired translational velocity and roll rate.

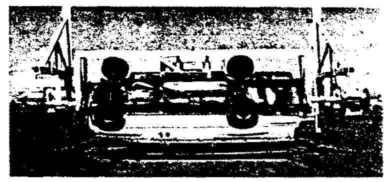

Figure 6: End view of the E-350 van attached to CRIS fixture.

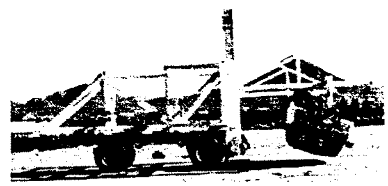

Figure 7: Left side view of the E-350 van attached to CRIS fixture.

RESULTS

DOLLY TEST - Two-dimensional high-speed film analysis was conducted of the dolly rollover test and the results were used to create the roll angle time history shown in Figure 8. The roll angle time history was created by identifying the time on the high-speed film that corresponded with each quarter revolution of the van. A noteworthy outcome of this analysis was that the roll angle appeared to be linear with time. Performing a linear regression of this angle data resulted in the regression equation provided below (Eq 1) with a calculated R^2 value of 0.997. The line produced by the linear regression is also shown in Figure 8.

$$\text{Roll Angle} = 168\ (\text{deg/sec})^{*}\ t + 23\ (\text{degrees}); \qquad \text{Eq 1}$$

The time datum in the dolly test occurred when the dolly began to decelerate, as opposed to a specific contact between the vehicle and the ground. Based on review of the high-speed film, the right side roof-rail area appeared to be in contact with the ground from 460 to 880 milliseconds. Using the regression equation (Eq 1) these two contact times equate to roll angles of 100 to 170 degrees. At 670 milliseconds, the midpoint of the right side roof rail contact, the roll angle of the van was approximately 135 degrees.

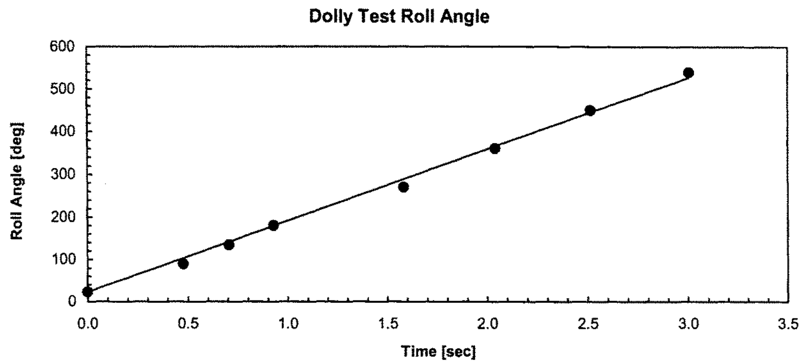

Figure 8: Roll angle time history for the E-350 van in the dolly test. The line represents a linear fit of the data. Beyond 3 seconds the van is sliding on its roof to rest.

Resultant accelerations at the center of gravity and roof-rail accelerations at the top of the A-, B-, and C-pillars were computed. The accelerations were filtered in accordance to SAE J211-1, channel frequency class (CFC) 60, since comparisons of the overall vehicle dynamics to structural members were to be made.

Figure 9 is the resultant acceleration from the center of gravity accelerometers. Figure 10, Figure 11, and Figure 12 present the resultant time history of the right side roof-rail accelerations for the first impact at the A-, B-, and C-pillars, respectively. This acceleration data indicates that the peak resultant accelerations occurred early in the right side roof rail contact.

The peak resultant accelerations from the first right side (on-side) roof rail impact were determined and are presented in Table 1 along with the corresponding time that the peak occurred. A table of the peak resultant accelerations for the first impact between the left side (off-side) roof rail, and the ground are presented in Table 2.

Table 1: Peak resultant acceleration for the right side roof-rail engagement in the first roll of the dolly test.

Dolly Test – First Right Side Roof Rail Impact

Location	Time (sec)	Acceleration (g)
Center of Mass	0.551	10
A-pillar	0.543	66
B-pillar	0.529	89
C-pillar	0.524	111

Table 2: Peak resultant acceleration for the left side roof-rail engagement in the first roll of the dolly test.

Dolly Test- Left Side Roof Rail Impact

Location	Time (sec)	Acceleration (g)
Center of Mass	1.002	4
A-pillar	0.945	33
B-pillar	0.964	18
C-pillar	0.967	14

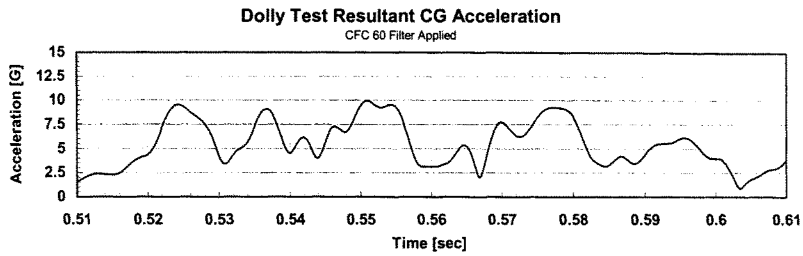

Figure 9: CG resultant acceleration in Dolly test during first contact between the right roof rail and the ground.

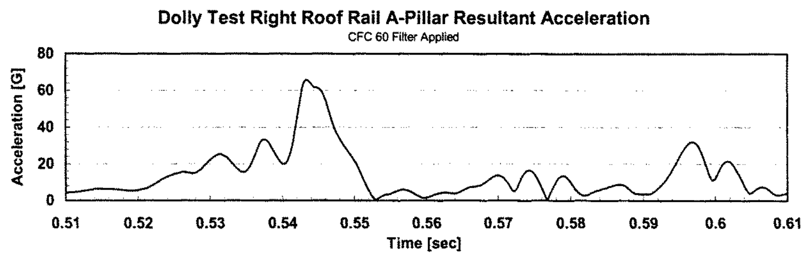

Figure 10: Right roof rail A-pillar resultant acceleration in Dolly test during first contact between the right roof rail and the ground.

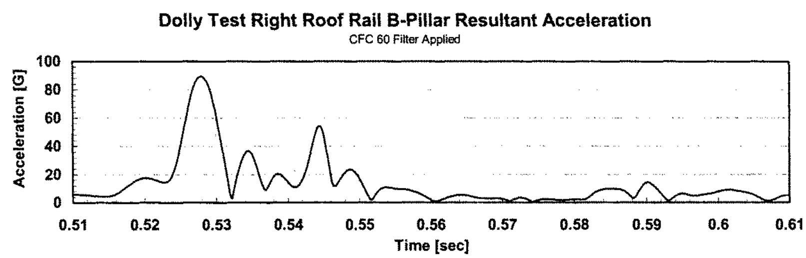

Figure 11 : Right roof rail B-pillar resultant acceleration in Dolly test during first contact between the right roof rail and the ground.

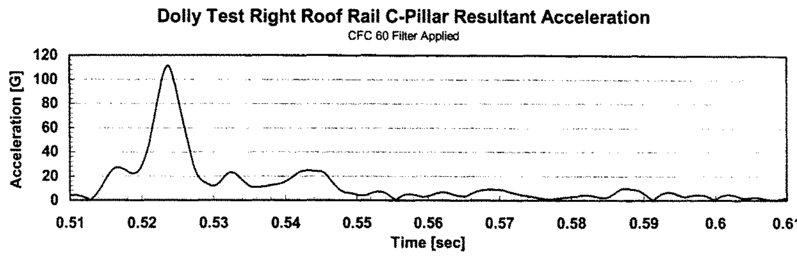

Figure 12: Right roof rail C-pillar resultant acceleration in Dolly test during first contact between the right roof rail and the ground.

CRIS TEST - The measured roll rate for the van is presented in Figure 13. There were short segments of the data between 1 and 2.25 seconds where the roll rate exceeded 640 degrees/second resulting in saturation of the A/D converter in the data acquisition system. The roll angle time history was computed using the two-dimensional high-speed film analysis method previously described. The roll angle was also calculated by integration of the measured roll rate. A comparison of the roll angle time film analysis to the integrated roll rate signal is presented in Figure 14. Good overall agreement between the film analysis and the numerical integration method was obtained. Close correlation of roll angle between these independent methods, in spite of the A/D saturation after 2.25 seconds, indicated that very little of the roll rate signal was clipped. This correlation also validates the method used to determine the roll angle time history in the dolly test, which was used as the basis for selecting the roll rate in the CRIS test.

Resultant accelerations at the roof-rails and cg were also determined in the CRIS test. Unlike the dolly test, the time datum in the CRIS test occurred at contact between the right side roof-rail and the ground. The peak resultant accelerations at the CG and at the right (on-side) and left (far-side) roof-rails during the first roll in the CRIS test were calculated and are presented in Table 3 and Table 4. Also presented are the corresponding times at which the peak resultant occurred.

Table 3: Peak resultant acceleration for the right side roof-rail engagement in the first roll of the CRIS test.

CRIS Test – First Right Side Roof Rail Impact

Location	Time (msec)	Acceleration (g)
Center of Mass	0.025	7
A-pillar	0.049	23
B-pillar	0.019	34
C-pillar	0.016	45

Table 4: Peak resultant acceleration for the left side roof-rail engagement in the first roll of the CRIS test.

CRIS Test – First Left Side Roof Rail Impact

Location	Time (msec)	Acceleration (g)
Center of Mass	0.234	11
A-pillar	0.228	72
B-pillar	0.217	82
C-pillar	0.218	50

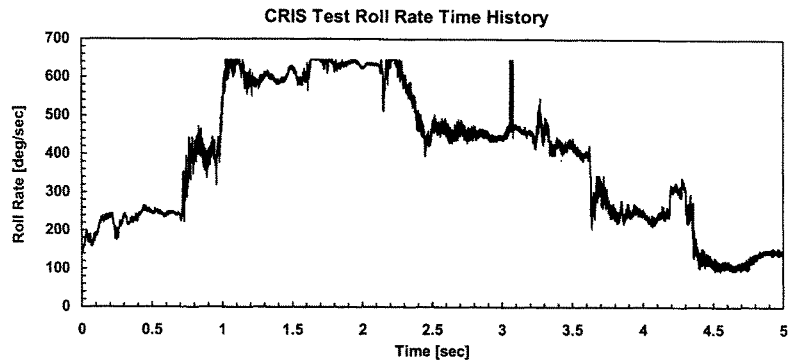

Figure 13: Roll rate time history for the E-350 van in the CRIS test.

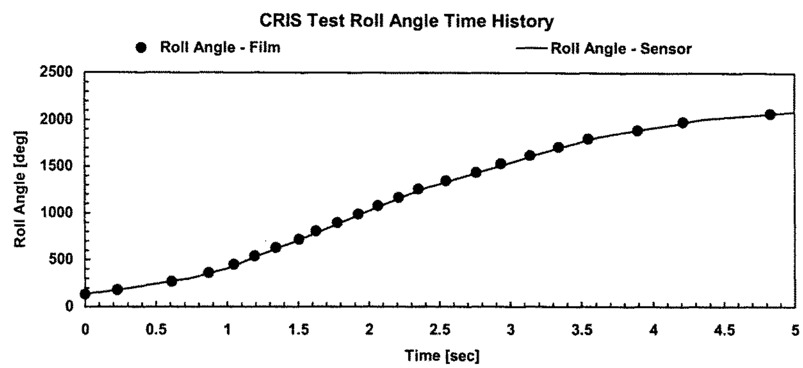

Figure 14: Roll angle computed from film analysis and integration the roll rate sensor's output in the CRIS test.

The calculated resultant acceleration history for the CG is presented in Figure 15. Note that the CG is located near the vertical plane that passes through the B-pillars and that the resultant CG acceleration trace in Figure 15 possesses a similar bimodal signature to that of the right roof-rail B-pillar resultant acceleration trace shown in Figure 17.

Resultant accelerations at the A- and C-pillar roof rail junctions are presented in Figure 16 and Figure 18, respectively. The impact duration at the right C-pillar was readily apparent as seen by the amplitude of the acceleration over the first 20 milliseconds. The A-pillar acceleration history was less distinct in that there was higher frequency content over a broader time range for the first 80-milliseconds.

The differences observed in the CRIS test roof-rail acceleration time histories, which are similar to those seen in the dolly test, appear to have to do with the contour and slope of the roof rail relative to the roll axis as well as the distribution of mass in the vehicle. The

engine and transmission are located in the front section of the vehicle and tend to keep the A and B-pillars in contact with the ground for longer durations. The larger acceleration amplitude and shorter duration at the C-pillar are consistent with less mass and the body pillar stiffness at the C-pillar location.

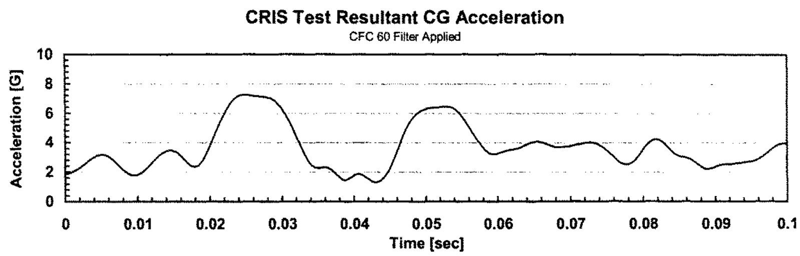

Figure 15: CG resultant acceleration history for CRIS test during first contact between the right roof rail and the ground.

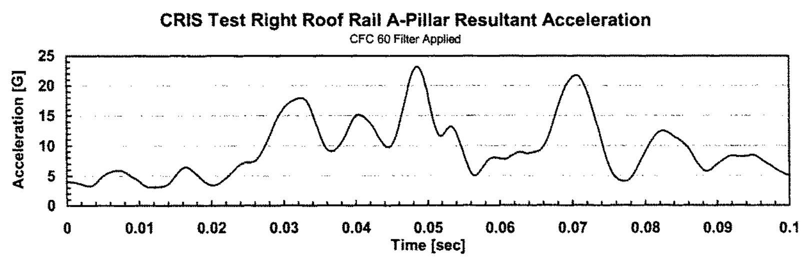

Figure 16: CRIS test right roof rail A-pillar resultant acceleration history during first contact between the right roof rail and the ground.

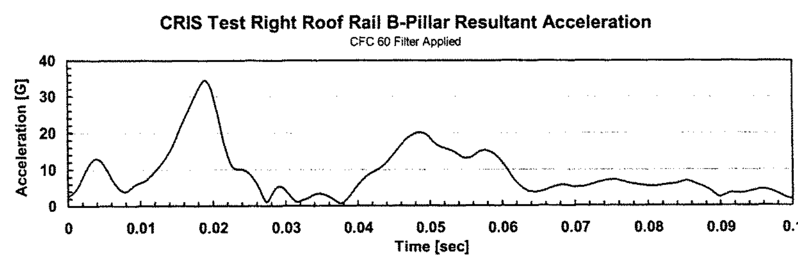

Figure 17: CRIS test right roof rail B-pillar resultant acceleration history during first contact between the right roof rail and the ground.

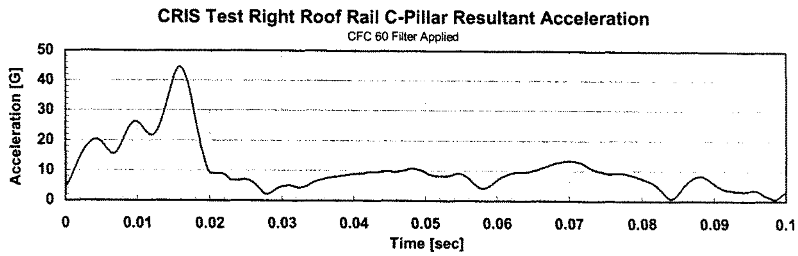

Figure 18: CRIS test right roof rail C-pillar resultant acceleration history during first contact between the right roof rail and the ground.

DISCUSSION

The initial kinetic energy in the dolly test was calculated to be approximately 873,000 N-m (644,000 ft-lbs). The total kinetic energy in the CRIS test was approximately 738,000 N-m (544,000 ft-lbs), with only 6,000 N-m (4,400 ft-lbs) coming from the initial roll rate of 149 deg/sec (roll moment of inertia approximately 1,735 kg-m^2 or 1,280 lbf-ft-s^2). For comparison purposes, the initial kinetic energy of the same van in a 48 kph (30 mph) frontal barrier FMVSS 208 test would be approximately 258,000 N-m (190,000 ft-lbs). These rollover tests therefore represent very high-energy events.

For the CRIS test, during the first right roof-rail/ground engagement the van rotated approximately 13.4 degrees. The tangential velocity of the undeformed roof rail at the B-pillar was approximately 4 m/s (13 ft/s) at a constant roll rate of 149 deg/s. Given that the translational velocity of the van was 23 m/s (75 ft/s), it became clear why the CRIS van experienced such high roll rates. The early contact with the ground rapidly converted the initial translational kinetic energy to rotational energy as measured by the roll rate sensor. In fact, at the points where the roll rate sensor saturated at a roll rate of 640 deg/sec the rotational kinetic energy of the van was approximately 108,000 N-m (80,000 ft-lbs), which is an 18-fold increase compared to the initial 6,000 N-m (4,400 ft-lbs) of rotational kinetic energy at release.

Based on dimensions of the van and the location of the roll axis, the right roof-rail is approximately 59 degrees CCW from the horizontal plane. A line passing through the rotation axis and the right roof rail would have to be rotated 149-degrees CW to be vertical. This would position the CG of the van in a static break-over-center orientation. The 133-degree roll angle at impact used in the CRIS test means the roll angle of the van was ahead of the undeformed break-over-center roll angle by 16 degrees. Striking 16 degrees prior to the break-over-center point means that the right roof-rail was not only dropping but also rotating into the ground at impact.

A noticeable difference in vehicle dynamics was observed between the dolly and CRIS tests. Even though both vehicles were subjected to similar initial conditions they responded in very different manners. In the dolly test the van rolled 1-1/2 times, achieved a nearly constant roll rate of about 168 deg/sec, yawed clockwise 108 degrees, and traveled approximately 66 meters (218 feet) between release and rest. The CRIS van rolled 6 times, sustained roll rates of more than 600 deg/sec, yawed clockwise 10 degrees, and traveled roughly 60 meters (197 feet) from the initial roof rail contact. Further, there was one roll sequence where the CRIS van was airborne for roughly 270 degrees of roll angle with the aft end clearing the ground by roughly 3 meters (10 feet) as shown in Figure 19. This is remarkable considering the van weighed just over 28,000 N (6,300 lbs). In contrast, the high-speed film footage of the dolly test indicated that the van spent a more time sliding on its sides and roof than it did rolling. The authors are of the opinion, based upon their experience in rollover reconstruction, that the vehicle dynamics observed in the CRIS test are more representative of the rollover events that they have studied in the real world.

Review of the high-speed film from the dolly test suggested that the trailing end of the right side roof-rail engaged the ground before the forward end in the first ground engagement. This uneven ground engagement induced a CW yaw that allowed the front of the van to lead for the remainder of the test. This phenomenon may explain, in part, the dramatic difference in vehicle dynamics between the two tests. At this point, the precise explanation for this phenomenon remains uncertain.

Although the number of vehicle rolls was significantly different between tests, the calculated average decelerations were similar. The dolly test produced an

average deceleration of 0.46 g compared to an average deceleration of 0.44 g for the CRIS test. These numbers are consistent with previously published values, which range from 0.36 to 0.61 g [8]. The implication of this similarity is that vehicle deceleration in a rollover event is not significantly affected by the number of rolls or the roll rate. However, it must be emphasized that this assertion is made for rollover events taking place on level paved surfaces. Rollover investigations that occur on the roadway generally do not take place on such flat terrain.

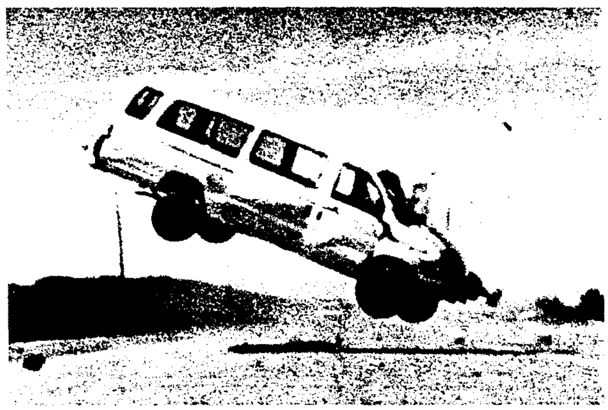

Figure 19: Single frame from the high-speed film camera mounted to rear of trailer, 4th roll.

Table 1 and Table 2 of the dolly test show that the roof-rail resultant accelerations ranged from at least 3.5 times up to as much as 11 times the resultant acceleration observed at the CG during the first contact between the right roof-rail and the ground. On average, the right (on-side) and left (off-side) roof-rails experienced 6 times the acceleration measured at the vehicle center of gravity. This measurable increase in the acceleration field demonstrates that the environment immediately adjacent to the roof rail is more severe than that measured at the CG during a roof-rail to ground impact. It is hoped that future studies will use the accelerometer configuration demonstrated here in combination with other instrumentation to more clearly define the occupant environment during rollover events.

The initial conditions used in the CRIS test were chosen to approximate the measured conditions for the first engagement of the right roof-rail in the dolly test. These initial conditions were based upon reasonable engineering assessments of the available electronic and photographic data from the dolly test. The translational speed in the dolly test was 88.5 kph (55.3 mph). Based on the available run-up distance, the maximum achievable translational speed for the CRIS fixture was 82.2 kph (51 mph). The initial target roll rate of 150-deg/sec in the CRIS test was selected based upon the first half roll of the van in the dolly test as opposed to the nearly linear roll rate of 168 deg/sec calculated over the full one-and-a-half rolls.

Based on a review of the high-speed film from the dolly test, the right side roof rail area appeared to be in contact with the ground at roll angles between 100 and 170 degrees. The target 135-degree roll angle was the midpoint between these roll angles observed in the high-speed film. Another consideration that was pertinent in the selection of the roll angle was the ground clearance required to allow the van to rotate about its roll axis without ground contact. The clearance was a function of the location of the principal axis and the van's exterior geometry. In the case of the E-350 van, the drop height increased for angles less than the 149-degree break-over-center angle. The 133-degree roll angle at impact resulted in the first roof-rail engagement approximately 16 degrees ahead of the static break-over-center angle. The five-inch drop height was considered to be the minimum practical clearance between the roof-rails and the ground to accommodate trailer jounce induced by vertical irregularities in the track surface.

The difference in the initial roll angle for the first right roof-rail contact represented the largest initial condition difference between the two tests. This difference in impact angle may have affected the first on-side and far-side roof-rail accelerations. The dolly test exhibited

higher amplitude roof-rail accelerations than the CRIS test for the right side (on-side) roof-rail engagement, while the CRIS test demonstrated larger accelerations for the left side (far-side) roof-rail engagement. With respect to overall vehicle dynamics, the authors are uncertain that such a change in impact angle would result in such dramatic differences. Nevertheless, further study is warranted to better investigate the relationship between impact angle and post-impact vehicle dynamics.

CONCLUSION

The dolly and CRIS tests produced two significantly different results, in terms of vehicle dynamics. Based on the author's collective accident reconstruction experience, the CRIS test result is more in line with what is generally observed in vehicle rollovers of this nature in the real world. To date, there has been relatively limited work done with the CRIS machine as compared to the 208 rollover dolly. The ability to conduct repeatable and controllable first roof-to-ground impacts with the CRIS machine will provide more opportunity to study vehicular rollover dynamics.

Comparisons within each test demonstrated that the accelerations along a roof rail during ground contact were greater than what was observed at the CG. Thus, a roof rail to ground engagement during a rollover produces a more severe environment near the roof rail than what is observed at the CG.

ACKNOWLEDGMENTS

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ABSTRACT

Three rollcaged and three production roof vehicles were exposed to matched-pair rollover impacts using the Controlled Rollover Impact System (CRIS). The roof-to-ground contacts were representative of severe impacts in previous rollover testing and real world rollovers. The seat belted dummies measured nearly identical head impacts and neck loads with or without the rollcage, despite significant roof crush in the production roof vehicles. Roof crush had no measurable influence on the severity of the head accelerations and neck loads.

INTRODUCTION

Numerous scientific and opinion publications address the role of roof strength in protecting occupants in rollover collisions (Moffatt 1995). Despite the long history of rollover test development (Carter 2002, Cooper 2001), to date there has been no repeatable dynamic rollover test method. The new CRIS rollover test device changed that. This device provides the capability to subject vehicles to identical roof-to-ground impacts, so that the influence of roof deformation on occupant forces may be examined.

The CRIS consists of a towed semi-trailer, which suspends and drops a rotating vehicle from a support frame cantilevered off the rear of the trailer, as shown in Figure 1 and Photograph 1 below. The suspended test vehicle is rotated at a predetermined roll rate and precisely dropped onto an asphalt test surface to achieve the desired impact conditions. The parameters of the ground impact as defined by the drop height, horizontal speed, yaw and pitch angles, roll rate and roll angle are specified before the test and are repeatable from test to test. The details of the CRIS are explained in "Repeatable Dynamic Rollover Test Procedure with Controlled Roof Impact" (Cooper 2001).

The testing presented here utilizes the CRIS to test six vehicles in matched-pair roof impacts with and without a rollcage. Two test conditions were selected to simulate severe roof-to-ground impacts observed in previous rollover crash tests and real world rollovers; (1) a low speed/low roll rate and (2) a medium speed/medium roll rate. In all tests, the first roof-to-ground impact was to the trailing side of the roof.

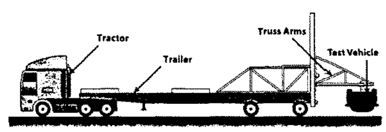
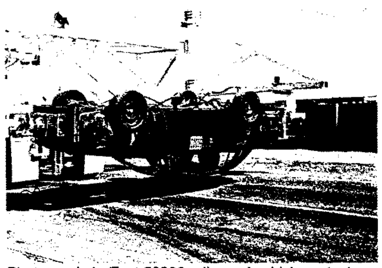


Figure 1. Schematic diagram of the CRIS



Photograph 1. Test 50302 rollcaged vehicle on test fixture

The CRIS also utilizes a newly developed technique that enables precise and repeatable positioning of the dummy at impact. This was accomplished using positioning cables, which maintain the lateral position of the dummy until the cables release milliseconds before the impact.

TEST VEHICLES AND DUMMY SPECIFICATION

All tests were conducted with 1998-2000 Ford Crown Victoria vehicles. The Crown Victoria is a full-sized, six-passenger, four-door sedan. It has a 291 cm (115 inch) wheelbase with a 114 cm (57 inch) overall height and a curb weight of 1,790 Kg (3,946 lbs).

In these matched-pair tests, one of each pair of vehicles was equipped with a rollcage. The rollcage was made up of approximately 12.2 m (40 feet) of 51 mm (2 inch) diameter 4.8 mm (3/16 inch) wall steel tubing and steel mount plates. There was no rollcage tubing in the area of the dummy head. The headliner was removed to facilitate camera coverage and observe the performance of the roof panel during head accelerations and neck loading for all tests. Figure 2 is an illustration of the rollcage configuration.

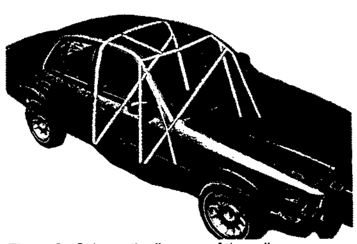


Figure 2. Schematic diagram of the rollcage configuration

The strength of the roof of the Crown Victoria with and without the rollcage was measured using the FMVSS 216 test methodology. The production roof had a peak strength of 36,725 N (8,256 lbs) at 71 mm (2.8 inches) of deformation. The rollcaged vehicle was also tested, but the Exponent FMVSS 216 fixture could not generate more than 111,690 N (25,109 lbs) at 86 mm (3.4 inches) of deformation, so the peak strength of the roof is not known.

In order to attach and balance the vehicle on the CRIS it was necessary to weld mounting fixtures to both the front and rear ends of the car, and to weld a truss fixture to its undercarriage to minimize flex while rotating. These additional fixtures weighed 469 Kg (1,032 lbs) and remained on the vehicle during the test. Each vehicle had three onboard cameras recording at 250 frames per second, one recording at 500 frames per second, and a video camera to monitor the pre-release dummy position. The total test weight of the vehicles, including the CRIS appurtenances, cameras, and other accessories was approximately 2,363 Kg (5,200 lbs) for the production roof vehicles and 2,400 Kg (5,278 lbs) for the rollcaged vehicles. These as-tested weights yield roof strength-to-weight ratios of 1.6 for the production roof cars and at least 4.8 for the rollcaged vehicles. The 1998 to 2000 Crown Victoria, before CRIS fixture additions, has a roof strength-to-curb weight ratio of 2.1.

The dummy was an instrumented 50% Hybrid III with a standing pelvis. The instrumentation consisted of head accelerometers and an upper neck load cell measuring axial force and torsion, lateral and longitudinal bending and shear. The data collection system consisted of a commercially available data acquisition system manufactured by EME Corporation. This unit was integrated into the Hybrid III spine box to provide a completely self-contained data acquisition system. All channels were acquired in accordance with the SAE J211 specification and all instruments were calibrated to National Institute for Standards and Technology (NIST) standards on a standard six-month rotation schedule. The Hybrid III head and neck were calibrated before, during and after the test program. All instrumentation and Hybrid III calibrations were within performance corridors.

The dummy was placed in the driver's seat, wearing the standard three-point continuous-loop, sliding latchplate restraint system. The electric split-bench seat was positioned 76 mm (3 inches) forward of full rear and in the highest position, resulting in approximately 102 mm (4 inches) of head clearance. The seat back was in an upright position at an angle of 29 degrees measured on the front surface of the seat back 10 inches above the seat cushion. In order to hold the dummy in the proper position during the rotation before the drop, a system of releasable positioning cables was developed. This positioning system consisted of two cables that attached near the base of the neck and two cables that attached

to the back of the pelvis. These flexible cables were each routed horizontally from the dummy to the B-pillar on each side of the vehicle and then through a turning block and back to a common release point on the floor pan transmission tunnel. The cable release was initiated by detonating an exploding bolt, which fired approximately 10 ms before roof-to-ground impact.

The seat cushion upper surface was equipped with a string potentiometer to measure its vertical displacement during the test. The cushion displacement measurement was defined to be zero with the dummy seated in the seat and the vehicle in the upright or zero roll and pitch condition. A positive displacement was defined as movement away from the floor.

TEST PROCEDURE

The matrix of test conditions was selected to represent rollover impacts that create significant roof crush. For each test condition, the vehicle was rotated on the CRIS at the specified roll rate and then precisely dropped so that the specified roll angle at the roof-to-ground impact was achieved.

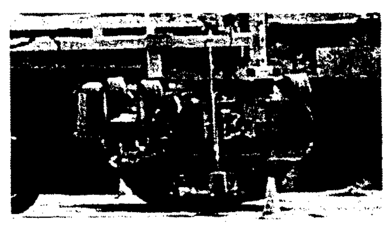
The dummy was positioned on the driver's seat midline and had 102 mm (4 inches) of head clearance with the vehicle upright. The production three-point seat belt was then placed on the dummy with proper routing and no slack in either the lap or shoulder belt. In order to photographically document seat belt movement, a 25 mm (1 inch) wide piece of tape was placed onto the shoulder belt, approximately 25 mm (1 inch) from the D-ring on the B-pillar. The adjustable D-ring was in its highest position. The positioning cables were attached to the dummy with slack in them. The vehicle was then slowly rotated 180 degrees counterclockwise such that the dummy was suspended upside down by the production lap/shoulder belt. The seat belt retractor was allowed to lock normally during the inversion. Once hanging, the dummy was settled into its static inverted position. The head of the inverted dummy was always within 6.4 mm (1/4 inch) of the roof panel, indicating about 96 mm (3-3/4 inches) of vertical excursion. The dummy positioning cables were then tightened. This tensioning of the cables did not change the vertical position of the dummy, but did limit its lateral movement during the spin-up phase prior to drop.

The CRIS test procedure involved first rotating the vehicle to the specified roll rate, and then driving the tractor/trailer at the specified horizontal speed to the drop zone. While approaching the drop zone, the position of the dummy was monitored from an onboard video camera.

PHASE 1 - RESULTS OF LOW SPEED/ LOW ROLL RATE TESTS

Four tests were conducted in Phase 1 to confirm repeatability. The first four tests were conducted with two rollcaged vehicles and then two production roof vehicles tested under the same initial conditions. The parameters of these tests were: clockwise roll direction (passenger side leading) at a roll velocity of 220 degrees/second, 185 degree roll angle at roof-to-ground impact, 12.8 kph (8 mph) horizontal speed, zero pitch, zero yaw, and a 279 mm (11 inch) drop height. The driver side dummy was on the "trailing" or "far" side of the roll. The conditions of this roof-to-ground impact are similar to the impact designated as 7L4, which is described in detail in the Malibu II report (Bahling 1990). Photographs 2, 3, 4, and 5 illustrate the position of the four Phase 1 vehicles at ground impact. (The test numbers are the date of the test, i.e. 50302 indicates May 3, 2002.)

Photograph 2. Test 50302 rollcaged vehicle at roof-to-ground contact



Photograph 3. Test 50902 rollcaged vehicle at roof-to-ground contact

Photograph 4. Test 51502 production roof vehicle at roof-to-ground contact

Photograph 5. Test 61102 production roof vehicle at roof-to-ground contact

All four tests were successfully performed, with the precise ground (asphalt) impact and the dummy position as intended. Table 1 lists the vehicle position and speed at impact. The vehicle and dummy positions at impact were documented through high-speed cameras. All of the head-to-roof contacts at ground impact were within the expected area on the roof panel. All of the positioning cables released before roof panel impact with the asphalt.

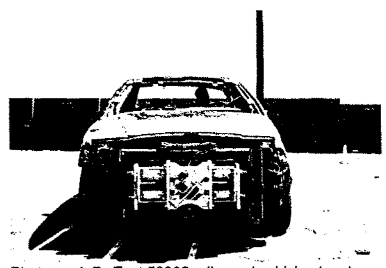
Table 1. Phase 1 (low speed/low roll rate) test conditions

Test ID	Roll Angle at Impact [deg]	Roll Rate [deg/sec]	Horizontal Speed [kph (mph)]	Drop Height [mm (in.)]
50302 Rollcaged	184	227	12.9 (8.0)	269 (10.6)
50902 Rollcaged	182	226	12.7 (7.9)	269 (10.6)
51502 Production Roof	184	223	12.9 (8.0)	281 (11.1)
61102 Production Roof	185	227	13.0 (8.1)	297 (11.7)

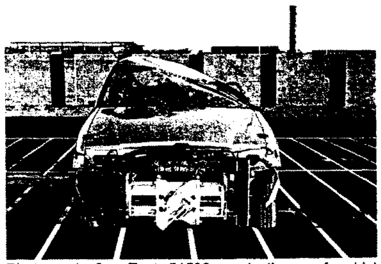
Both rollcaged vehicles rolled one complete revolution (counting the initial roof-to-asphalt impact as one-half roll) and came to rest on their wheels with minimal roof damage. Both production roof vehicles rolled one-half revolution (remained on the roof after impact) and had significant roof damage. Photographs 6, 7, 8, and 9 show the four vehicles in an upright position after each test.

In each test the dummy remained in the seat belt. At the time of peak axial neck loading, the seat the seat cushion displacement data indicated that the dummy was never compressed between the roof and the seat. After the first production roof test (51502), when the vehicle was on its roof at rest, the dummy head position was laterally restrained by a wrinkle in the roof panel resulting in a residual lateral neck moment of approximately 70 N-m. This was long after the peak neck loads had occurred.

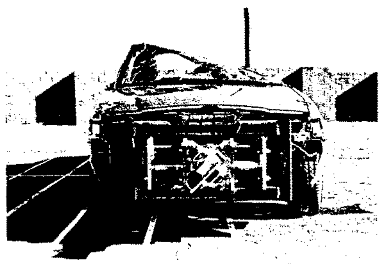
Photograph 6. Test 50302 rollcaged vehicle at rest post-test



Photograph 7. Test 50902 rollcaged vehicle at rest post-test



Photograph 8. Test 51502 production roof vehicle post-test, upright



Photograph 9. Test 61102 production roof vehicle post-test, upright

The dummy peak neck axial loads were nearly identical for the rollcaged and production roof vehicles. These results are summarized in Table 2.

Table 2. Phase 1 (low speed/low roll rate) dummy data

Measurement	50302 (Rollcaged)	50902 (Rollcaged)	51502 (Production Roof)	61102 (Production Roof)
Neck Compression Fz [N]	11439.8 @ 13.8 ms	10500.5 @ 21.1 ms	11220.9 @ 8.9 ms	10202.2 @ 10.5 ms
Head Injury HIC	1818 @ 7.3 to 8.4 ms	1784 @ 15.1 to 16.1 ms	2639 @ 2.0 to 2.9 ms	1326 @ 3.3 to 4.7 ms
Neck Injury Nij	Ncf =1.88 @ 13.6 ms	Ncf = 1.80 @ 21.3 ms	Ncf = 1.95 @ 8.6 ms	Ncf = 1.87 @ 13.0 ms

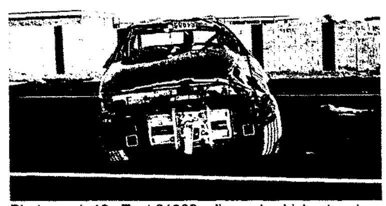
PHASE 2 - RESULTS OF MEDIUM SPEED/ MEDIUM ROLL RATE TESTS

Phase 2 of this test series involved two matched tests; the first with a rollcaged vehicle and the second was a production roof vehicle. The vehicle was again rolled clockwise (passenger side leading) with the dummy in the driver's seat on the trailing side of the roll. The roll rate was 360 degrees/sec and the horizontal speed was 32 kph (20 mph). The roll angle, pitch, yaw, and specified drop height were unchanged from Phase 1. As in Phase 1, both vehicles impacted the ground in a repeatable manner, and the dummy was in the same position for each test. Table 3 lists the vehicle conditions at impact.

Table 3. Phase 2 (medium speed/medium roll rate) test conditions

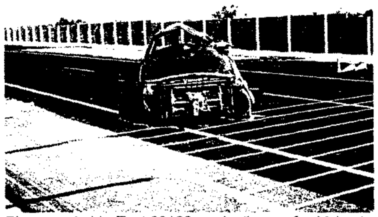
Test ID	Roll Angle at Impact [deg]	Roll Rate [deg/sec]	Horizontal Speed [kph (mph)]	Drop Height [mm (in)]
61802 (Rollcaged)	190	363	32.0 (19.9)	325 (12.8)
62102 (Production Roof)	186	361	32.0 (19.9)	322 (12.7)

The rollcaged vehicle rolled two and three-quarter times (counting the initial roof-to-asphalt impact as one-half roll) and came to rest on the driver's side with minimal roof damage. The production roof vehicle rolled a total of three times and came to rest on its wheels. The production roof sustained extensive deformation in the initial impact, but very little damage in subsequent rolls. Photographs 10 and 11 illustrate both vehicles post-test.



Photograph 10. Test 61802 rollcaged vehicle at rest post-test after uprighting

The neck axial loads in these tests were nearly identical for the rollcaged and production roof vehicles. Table 4 lists the measurements recorded by dummy instrumentation for these two tests. The peak head accelerations and neck loads of the dummy occurred before any significant roof deformation. Neither dummy was compressed between the roof and the seat. Again, the presence of the rollcage served no benefit in reducing the severity of the impact to the dummy. The roof crush did not cause or enhance head accelerations and neck injury measurements recorded by the dummy instrumentation.



Photograph 11. Test 62102 production roof vehicle at rest post-test

Table 4. Phase 2 (medium speed/medium roll rate) dummy data

Measurement	61802 (Rollcaged)	62102 (Production Roof)
Neck Compression Fz [N]	9987.6 @ 7.5 ms	9795.5 @ 10.3 ms
Head Injury HIC	2797 @ 2.9 to 3.9 ms	2035 @ 4.0 to 5.1 ms
Neck Injury Nij	Ncf = 1.80 @ 10.3 ms	Ncf = 1.78 @ 10.5 ms

DISCUSSION

The dummy instrumentation recorded essentially the same peak neck loads regardless of roof/pillar deformation. A comparison of the neck compression loading (Fz) is presented in Figure 3. The dummy peak axial neck loads were a result of the impact from the dummy moving head-first into the ground with the roof panel between the head and the ground. The neck loading was not caused by the roof "moving in" on the dummy. This can clearly be seen in the high-speed films. The dummy data, when correlated with the high-speed film, shows that the peak neck loads occurred before any significant roof/pillar deformation.

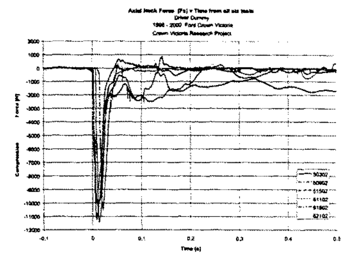
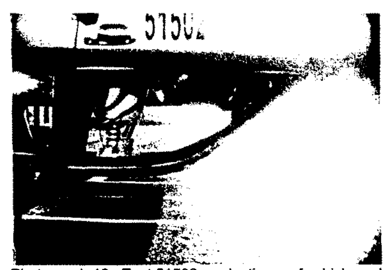


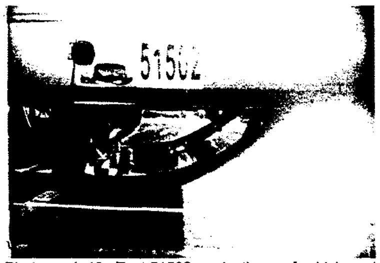
Figure 3. Axial neck force

To understand the reason why the dummies measure the same peak axial neck loads regardless of roof deformation severity, the mechanics of roof/pillar deformation and occupant kinematics must be understood. Photographs 12, 13, 14, and 15 are stills taken from the high-speed films of test 51502 of Phase 1. These photographs show the side view of the car moments before impact, at roof-to-ground impact, at the time of peak axial neck load, and at the time of severe roof/pillar deformation. As illustrated, when the roof contacts the ground, the vertical motion of the roof side rail stops because the roof cannot penetrate the asphalt test surface. The roof rail translational velocity (the resultant of the vertical and horizontal components) is nearly zero, as indicated by its position relative to the ground reference lines on the asphalt test surface.

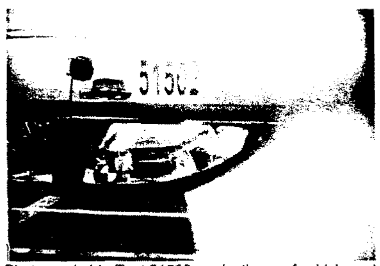
The mechanism of the overall roof/pillar deformation is that the roof strikes the ground and then the lower body of the vehicle continues to move toward the roof. The roof panel does not "move in" away from the ground during the deformation.



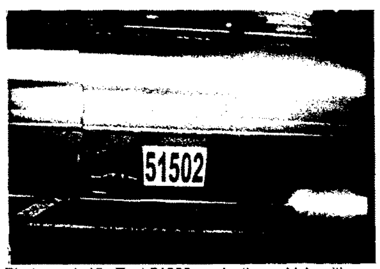
Photograph 12. Test 51502 production roof vehicle and dummy prior to impact



Photograph 13. Test 51502 production roof vehicle and dummy at roof-to-ground contact



Photograph 14. Test 51502 production roof vehicle and dummy at peak axial neck load



Photograph 15. Test 51502 production vehicle with significant roof/pillar deformation

Photographs 12 through 15 show that at the instant before ground impact the dummy head was at the inside of the roof panel. Together, the head and roof panel were moving toward the ground. When the roof panel struck the ground it stopped moving vertically. Since the dummy head was against the roof panel, it also stopped. The dummy mass continued to move toward the roof panel, compressing the neck between the stopped head and the moving torso of the dummy. The peak head accelerations and neck loads of the dummy occurred during the initial head/roof impact with the ground, not subsequently during the roof/pillar deformation. Photograph 14 shows the side view of the car at the time of peak neck/head load, when there is no significant roof/pillar deformation. The significant roof/pillar deformation occurred long after the peak head accelerations and neck loads occurred.

The onboard camera of the head/roof-to-ground impact from test 51502 of Phase 1, gives another perspective of the event described in the previous paragraph. Photograph 16 shows the dummy immediately prior to impact. The lateral positioning cables have been released, as evidenced by their slack. Photograph 17 illustrates the time of roof-to-ground impact. Photograph 18 shows the dummy at approximately the time of the peak neck load, which was at 8.9 ms after ground impact. There is negligible roof/pillar deformation at the time of peak axial neck load. The high-speed films show that the windshield was not broken when the peak axial neck load occurred. Photograph 19 shows an onboard view of the vehicle interior with significant roof/pillar deformation long after the neck load had peaked.

Photograph 16. Test 51502 production roof vehicle and dummy prior to impact, interior view

Photograph 17. Test 51502 production roof vehicle and dummy at initial roof-to-ground contact


Photograph 18. Test 51502 production roof vehicle and dummy at peak neck load


Photograph 19. Test 51502 production roof vehicle with significant roof/pillar deformation

Photographs 16, 17, 18, and 19 were taken from an onboard camera, which was mounted to the floorpan of the vehicle. During roof/pillar deformation, the camera and the vehicle lower body continued to move toward the roof and ground. In the films it appears to be the opposite. It appears as if the roof is moving toward the camera. The confusion is removed by simultaneously viewing the on-board view with an off-board view, which clearly shows that when roof/pillar deformation is occurring there is solid ground on the outside of the roof. Thus, it is not the roof that is moving, it is the lower body of the car and camera moving toward the roof and ground.

The Hybrid III dummy is a repeatable surrogate to compare head accelerations and neck loads. It was not intended in these rollover tests to make a judgment whether the forces recorded by the dummy instrumentation were representative of certain injury levels to humans. They are simply being used for comparison of the rollcaged and production roof tests.

The physics of these rollover impact tests hold true for both humans and dummies. Whether a test dummy or a human is involved, they both would have a head-first velocity toward the ground. They both would experience high head accelerations and neck loads when the head and roof panel stopped. They both would have sustained the peak head acceleration and neck load long before any significant roof/pillar deformation occurred. Therefore, roof/pillar deformation does not affect injury potential for seat belted occupants whose heads are at or near the roof at the time and location of roof-to-ground impact.

CONCLUSIONS

1. In this comparison of rollcaged and production roof vehicles there was no significant difference in the dummy head accelerations and neck loads, despite extensive roof/pillar deformation of the production roof cars.
2. The peak head accelerations and neck loads were a result of the roof striking the ground and stopping and were not related to roof/pillar deformation.
3. If humans were subjected to these same impact conditions, their head and neck injury potential would also have resulted from the impact at the ground and not from the roof/pillar deformation. The rollcaged vehicles would not have protected them.
4. The Controlled Rollover Impact System (CRIS) is a reliable tool to conduct very repeatable rollover impacts with controlled dummy positioning.

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Rollover Crash Sensing and Safety Overview

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ABSTRACT

This paper provides an overview of rollover crash safety, including field crash statistics, pre- and rollover dynamics, test procedures and dummy responses as well as a bibliography of pertinent literature. Based on the 2001 Traffic Safety Facts published by NHTSA, rollovers account for 10.5% of the first harmful events in fatal crashes; but, 19.5% of vehicles in fatal crashes had a rollover in the impact sequence. Based on an analysis of the 1993-2001 NASS for non-ejected occupants, 10.5% of occupants are exposed to rollovers, but these occupants experience a high proportion of AIS 3-6 injury (16.1% for belted and 23.9% for unbelted occupants). The head and thorax are the most seriously injured body regions in rollovers.

This paper also describes a research program aimed at defining rollover sensing requirements to activate belt pretensioners, roof-rail airbags and convertible pop-up rollbars. The work required an understanding of the most relevant conditions for field rollovers, vehicle responses and occupant kinematics in the vehicle. The most common rollovers involve a soil trip, fall-over and curb trip. These conditions were simulated in laboratory tests where measurements were made with rate gyros, accelerometers and instrumented dummies. Cross-plots of vehicle roll rate and angle were used to consider triggering requirements for safety systems and to determine the timing of occupant motion in the vehicle. Some rollovers require triggering of safety systems when the vehicle has only a 10^0-20^0 roll angle because roll angular velocities exceed 100^0/s.

LITERATURE SEARCH

During the past decades, there has been a steady increase in studies addressing rollover crashes and injuries. Though rollovers are not the most frequent crash type, they are significant with respect to serious injuries. One contributing factor to the strong interest is the introduction of SUVs, vans and light trucks, in particular in the North American market.

Significance: Although rollovers in the U.S. represent less than 5% of all vehicle crashes (NHTSA 1999), they account for approximately 15% of serious (AIS 3+) injuries and 20-25% of fatalities (Cohen, Digges 1989). In 1999, 10,140 people were fatally injured in a light vehicle rollover (NHTSA 2001). Light vehicles are defined as passenger cars, light trucks, pickups and vans. Of those rollover fatalities, 8,348 were in a single-vehicle crash, where the majority of single-vehicle crash fatalities involve a rollover. In the 1995 to 1999 NASS-CDS database, 81% of tow-away rollovers were single-vehicle crashes (NHTSA 2001).

Most serious and fatal injuries in rollovers result from ejection (Partyka 1979, NHTSA 2001), and unbelted occupants have a higher risk of ejection than those belted (Hight 1972, Pywell 2001). Restraint use reduces serious injury risks by more than 80% (Huelke 1977) and fatal injuries by more than 65% (Evans 1990).

Injuries: In a rollover, head and neck injuries lead to the highest occupant harm (McGuigan, Bondy 1980; Digges, Malliaris 1998). Using NASS-CDS data,

Table 1: Crashes by First Harmful Event, Manner of Collision, and Crash Severity
(Reprinted from Traffic Safety Facts 2002 and adding the Ratio column)

First Harmful Event	Fatal		Injury		Property Damage		Ratio
	No.	%	No.	%	No.	%	Injury/Fatal
Collision with Motor Vehicle in Transport:							
Angle	7,434	19.7%	669,000	33.4%	1,257,000	29.4%	90
Rear End	1,963	5.2%	600,000	30.0%	1,278,000	29.8%	306
Sideswipe	662	1.8%	65,000	3.2%	357,000	8.3%	98
Head On	5,174	13.7%	62,000	3.1%	47,000	1.1%	12
Other/Unknown	57	0.2%	*	*	2,000	0.0%	*
Subtotal	**15,290**	**40.5%**	**1,395,000**	**69.6%**	**2,941,000**	**68.7%**	**91**
Fixed Object:							
Pole/Post	1,918	5.1%	65,000	3.2%	129,000	3.0%	34
Culvert/Curb/Ditch	2,254	6.0%	73,000	3.6%	133,000	3.1%	32
Shrubbery/Tree	3,088	8.2%	58,000	2.9%	75,000	1.8%	19
Guard Rail	1,143	3.0%	34,000	1.7%	64,000	1.5%	30
Embankment	1,229	3.3%	34,000	1.7%	30,000	0.7%	28
Bridge	365	1.0%	7,000	0.3%	8,000	0.2%	19
Other/Unknown	1,671	4.4%	66,000	3.3%	147,000	3.4%	39
Subtotal	**11,668**	**30.9%**	**337,000**	**16.8%**	**587,000**	**13.7%**	**29**
Collision with Object Not Fixed:							
Parked Vehicle	433	1.1%	33,000	1.6%	323,000	7.5%	76
Animal	165	0.4%	19,000	0.9%	273,000	6.4%	115
Pedestrian	4,528	12.0%	70,000	3.5%	*	*	15
Pedalcyclist	729	1.9%	44,000	2.2%	5,000	0.1%	60
Train	261	0.7%	1,000	0.0%	*	*	4
Other/Unknown	254	0.7%	10,000	0.5%	46,000	1.1%	39
Subtotal	**6,370**	**16.9%**	**177,000**	**8.8%**	**648,000**	**15.1%**	**28**
Noncollision:							
Rollover	3,964	10.5%	82,000	4.1%	52,000	1.2%	21
Other/Unknown	478	1.3%	12,000	0.6%	54,000	1.3%	25
Subtotal	**4,442**	**11.8%**	**94,000**	**4.7%**	**105,000**	**2.5%**	**21**
Total	**37,795****	**100%**	**2,003,000**	**100%**	**4,282,000**	**100%**	**53**

*Less than 500 or less than 0.05%
**Includes 25 fatal crashes with an unknown first harmful event.

Table 2: Vehicles Involved in Crashes by Vehicle Type, Rollover Occurrence, and Crash Severity (Reprinted from Traffic Safety Facts 2002).

	Rollover Occurrence					
	Yes		No		Total	Ratio
	No.	%	No.	%	No.	No/Yes
Fatal Crashes:						
Passenger Car	4,294	15.7%	23,135	84.3%	27,429	5.4
Light Truck						
Pickup	2,755	25.1%	8,206	74.9%	10,961	3.0
Utility	2,086	35.2%	3,836	64.8%	5,922	1.8
Van	716	19.2%	3,014	80.8%	3,730	4.2
Other	15	13.8%	94	86.2%	109	6.3
Large Truck	622	13.0%	4,171	87.0%	4,793	6.7
Bus	9	3.1%	283	96.9%	292	31.4
Other/Unknown	150	11.3%	1,178	88.7%	1,328	7.9
Total	**10,647**	**19.5%**	**43,917**	**80.5%**	**54,564**	**4.1**
Injury Crashes:						
Passenger Car	77,000	3.4%	2,201,000	96.6%	2,279,000	28.6
Light Truck						
Pickup	43,000	7.8%	507,000	92.2%	550,000	11.8
Utility	41,000	10.6%	344,000	89.4%	385,000	8.4
Van	9,000	3.4%	259,000	96.6%	268,000	28.8
Other	1,000	6.3%	15,000	93.8%	15,000	15.0
Large Truck	11,000	12.2%	79,000	87.8%	90,000	7.2
Bus	**	**	11,000	99.3%	12,000	**
Other/Unknown	2,000	22.2%	7,000	77.8%	9,000	3.5
Total	**183,000**	**5.1%**	**3,424,000**	**94.9%**	**3,607,000**	**18.7**
Property-Damage Crashes:						
Passenger Car	39,000	0.9%	4,360,000	99.1%	4,399,000	111.8
Light Truck						
Pickup	26,000	2.1%	1,205,000	97.9%	1,231,000	46.3
Utility	23,000	2.8%	794,000	97.2%	817,000	34.5
Van	6,000	1.0%	579,000	99.0%	585,000	96.5
Other	**	**	46,000	99.5%	46,000	**
Large Truck	7,000	2.1%	328,000	97.9%	335,000	46.9
Bus	**	**	42,000	100.0%	42,000	**
Other/Unknown	**	2.9%	10,000	97.1%	10,000	**
Total	**102,000**	**1.4%**	**7,364,000**	**98.6%**	**7,466,000**	**72.2**

*Excludes motorcycles
**Less than 500 or less than 0.05 percent.

Yoganandan et al. (1989) showed that the incidence of cervical and thoraco-lumbar injury was highest in rollover crashes as compared to other crash modes. Most neck injuries result from a "diving" mechanism where the head stops and the neck is deformed by the torso momentum (Bahling et al. 1990). Neck injury mechanisms primarily include flexion-compression, lateral bending with compression, and extension-compression (Ward et al. 2001, Viano 1992). Neck injuries due to head-to-interior contact include, vertebrae body burst and wedge fractures, facet dislocations, subluxation, transverse and spinous process fractures. In addition to serious (MAIS 3+) head and neck injuries for non-ejected drivers, thorax injuries have also been frequently reported in both U.S. and U.K. rollovers (Parenteau et al. 2001).

Causes: There is debate in the literature on the effect of roof crush on occupant injury mechanisms in a rollover. Some key findings will be highlighted. In the early 1950s, it was assumed that roof strength played a role in occupant safety; the stronger, the safer. Later, MacKay (1968) supported this assumption by reviewing rollover cases and finding that injury severity seemed to be associated with roof intrusion. However, soon after, no correlation between roof crush and injury severity was observed for lap belted occupants (Huelke 1972), and subsequent studies reinforced the finding (MacKay 1991, Piziali 1998, Lund 1999).

Strother et al. (1984) and Platiras et al. (1985) found that occupant injury is related to occupant-interior contact velocity rather than intrusion per se for all but the most violent crashes. Any association between injury and intrusion is likely a manifestation of crash severity rather than a cause-effect relationship between intrusion and injury. Partyka (1992) found that roof intrusion reflects crash severity and that occupant contacts with vehicle interior components can produce injury even when there is no intrusion and preventing intrusion may not always prevent injury from roof contact. Rechnitzer et al. (1995) determined a relationship between roof crush and spinal injuries. For high levels of roof crush, the main mechanism appears to be axial compression and bending of the spine due to head contact from a reduction in the vertical space. However, spinal injuries could also occur with small roof intrusion. Head injuries are often due to contact with the "ledge" formed by the underside of the door/roof frame as it impacts the ground.

In the late 1980s, a series of dolly rollover tests, which were part of the so-called Malibu study, were carried out with belted and unbelted dummies and with production and reinforced roofs (Orlowski et al. 1985, Bahling et al. 1990, 1995). One of the main conclusions of these studies was that there was no additional safety benefit from roofs with stiffness greater than the FMVSS 216 requirement. In fact, the stronger roof can increase the number of vehicle rolls. More recent testing by Moffat et al. (2003) continued to show a lack of causal relation between roof crush and head-neck loading, because interior impacts often do not coincide with the timing or location of roof crush.

Even with these studies, the role of roof crush and occupant injury remains an area of investigation with various points of view on the mechanisms of injury. Bedewi et al. (2003) showed that serious head and neck injuries occur at a higher rate with roof crush above the limit specified in FMVSS 216. Clearly, greater vehicle crush occurs in more severe crashes and the more severe the crash, the greater the risk of injury. However, the complex dynamics of vehicles in rollovers involves various timings of unbelted and belted occupant motion in the vehicle during roof crush.

2001 TRAFFIC SAFETY FACTS

Using NHTSA's Traffic Safety Facts (2002), Table 1 summarizes fatal, injury and property damage crashes by the first harmful event and manner of collision in 2001. There were 37,795 fatal crashes and 2,003,000 injuries available for analysis. There were 3,964 fatal rollover collisions or 10.5% of all fatal crashes by first harmful event. There were 21 injury crashes for every fatal rollover, a ratio below average for all crash types.

Table 2 summarizes the vehicles involved in fatal and injury crashes by the occurrence of a rollover that can occur at any point in the crash sequence (not just the first harmful event). 19.5% of all fatal crashes involve a rollover in the crash sequence. The rate is higher for utility vehicles and trucks, which also have the lowest ratio of "no to yes" rollover in the sequence. The rate of rollovers is much less for injury and property damage crashes.

FIELD CRASHES: 1993-2000 NASS

In addition to the available published data, crash analysis was carried in this study. The field data was obtained from the 1993-2000 National Automotive Sampling System-Crashworthiness Data System (NASS-CDS). NASS-CDS consists of police reported tow-away traffic crashes in the U.S. This database contains about 5,000 crashes per year. Statistical sampling weights are provided, so that results can be extrapolated to represent U.S. crash experience. The CDS data include detailed information from the NASS investigation teams.

Passenger cars include mini, small, midsize, and large automobiles and automobile derivatives. Light truck vehicles include pickups, vans and light trucks with a mass $\leq$ 4,500 kg. The following definitions were used to characterize the type of crash:

- Rollover: All crashes where the vehicle rolled at least a ¼turn.
- Frontal: Non-rollover crashes where the principal impact location was the vehicle front (GAD1='F').
- Side: Non-rollover crashes where the principal impact was the vehicle side (GAD1='L' or 'R').

- Rear: Non-rollover crashes where the principal impact location was the vehicle rear (GAD1='B').

GAD 1 is a NASS variable defining the location with most damage. Table 3a summarizes the unweighted and weighted count of vehicle crashes for the analysis years where occupants were not ejected. Table 3b gives the count for belted and unbelted occupants.

Table 3a: 1993-2000 NASS Crash-Type Vehicle Count.

Crash Type	Unweighted		Weighted	
	No.	%	No.	%
Front	22,527	52.8%	9,563,502	51.4%
Side	9,767	22.9%	4,235,887	22.8%
Rear	2,215	5.2%	1,415,450	7.6%
Rollover	4,927	11.5%	1,526,929	8.2%
Other	277	0.6%	128,565	0.7%
Unknown	2,969	7.0%	1,722,854	9.3%
Total	**42,682**	**100%**	**18,593,187**	**100%**

Table 3b: 1993-2000 NASS Occupant Count.

Crash Type	Unweighted			Weighted		
	Belted	Unbelted	%	Belted	Unbelted	%
Front	15,878	8,291	65.7%	8,093,895	2,378,831	77.3%
Side	7,615	2,846	72.8%	3,886,984	774,809	83.4%
Rear	2,021	346	85.4%	1,330,785	149,461	89.9%
Rollover	3,352	1,571	68.1%	1,607,876	388,702	80.5%
Total	**28,866**	**13,054**	**68.9%**	**14,919,540**	**3,691,803**	**80.2%**

For this study of NASS-CDS, drivers and right front passengers over the age of 12 were included. Occupants are defined by seating positions 11 and 13 in the database. Each occupant was subdivided into either a belted or unbelted condition at the time of the crash. Injuries were classified using the NASS-93 coding system where AIS 1, 2, 3-6 and 9 were grouped by body region and crash type.

Table 4 summarizes the weighted injury results by body regions, while Table 5 summarizes the unweighted data. The risk of serious injury was calculated for the belted and unbelted occupants based on the number of AIS 3-6 per AIS 1 injuries. The overall risk was higher for unbelted than belted occupants. Seat belts reduce the risk of serious injury by 70-95% for the spine/neck, 52% for the head and 44% for the chest. For lower extremity injuries, the risk was higher in rollovers than in other crash modes.

While the previous epidemiology focused on non-ejected occupants, one aspect of ejection was investigated. A review of NASS-CDS cases from 1997 to 2000 was carried out to better understand the kinematics and mechanisms of complete ejection for belted occupants. The main results are presented in Table 6, which summarizes the findings from the NASS-CDS investigators found in on-line reports at NHTSA. The majority of cases involve passive shoulder belts where the manual lap belt was not used in the crash. It also shows the extreme, even catastrophic, characteristics of vehicle damage in these cases. The review allows one to infer that the use of the lap belt would have improved occupant retention and reduced ejection risks in these rollovers. Evans (1990) discussed the role of the lap belt in fatal rollover crashes.

Occupant Kinematics: Rollover crashes involve more complex occupant motion than other crash modes (Digges 1991). Rollovers often include a tripping phase, a roll phase and a ground-impact phase. Occupant kinematics in the rollover phases have been described by Moffatt (1975, 1999). During the tripping phase, the occupant tends to tilt in the direction of the vehicle movement, while in the roll phase, the occupant tends to move upwards and outwards, away from the vehicle center of gravity. In the ground contact phase, the occupants tend to continue moving at their original velocity until they contact the vehicle interior.

Occupant kinematics are better controlled by belt usage, which limits occupant excursion and increases retention. Obergefell (1986) investigated belted occupants in a rollover simulation and observed that, during the vehicle's roll phase, the occupant was held in the seat and against the door. However, she noticed that the upper torso could slide out of the belt, primarily for outboard occupants. Piziali et al. (1998) observed during longitudinal rolls that the outboard occupant (occupant opposite to the leading vehicle side) is more at risk than the inboard occupant due to body orientation and the velocity vector at impact.

Vehicle Kinematics: More than 90% of vehicle rollovers occur around the longitudinal vehicle axis (Digges 1991). In the NASS-CDS database, different definitions are used to describe various rollover types. NASS-CDS definitions from the coding manual include:

Trip-over - When the lateral motion of the vehicle is suddenly slowed or stopped inducing a rollover. The opposing force may be produced by a curb, pot-hole, or pavement that the vehicle wheels dig into.

Fall-over - When the surface on which the vehicle is traveling slopes downward in the direction of vehicle movement so that the center of gravity (cg) becomes outboard of its wheels. The distinction between this code and turn-over is a negative slope.

Flip-over - When a vehicle is rotated around its longitudinal axis by a ramp-like object such as a turned down guardrail or the back slope of a ditch. The vehicle may be in yaw when it comes in contact with a ramp-like object.

Bounce-over - When a vehicle rebounds off a fixed object and overturns as a consequence. The rollover must occur in close proximity to the object from which it is deflected.

Table 4: Weighted 1993-2000 NASS Injuries by Impact Type, Body Region, Severity and Belt Usage.

FRONT	Injury	Head	Face	Neck	Thorax	Abdomen	Spine	UX	LX	Total
Belted	**AIS 1**	378,379	1,644,557	238,224	1,427,506	480,517	1,154,925	2,399,883	2,276,958	10,110,000
	AIS 2	97,157	40,200	594	74,048	36,828	34,558	183,490	314,679	781,554
	AIS 3-6	46,971	4,740	95	71,372	20,176	9,093	42,320	61,862	256,827
	AIS 9	6,089	51	133	6,880	11,003	350	640	191	25,337
Subtotal		**528,596**	**1,689,548**	**239,046**	**1,579,806**	**548,524**	**1,198,927**	**2,626,333**	**2,653,690**	**11,178,122**
Not belted	**AIS 1**	407,123	2,026,613	49,894	369,686	93,097	302,698	818,139	1,244,131	5,367,250
	AIS 2	127,975	70,072	8,574	35,359	28,600	47,369	75,467	224,146	617,562
	AIS 3-6	78,302	13,374	846	82,100	17,620	9,645	42,983	79,453	325,217
	AIS 9	23,703	70	36	8,651	12,099	20	272	242	45,093
Subtotal		**637,103**	**2,110,129**	**59,349**	**495,796**	**151,416**	**359,732**	**936,861**	**1,547,972**	**6,355,124**
RISKS										
Belted		11.0%	0.3%	0.0%	4.8%	4.0%	0.8%	1.7%	2.6%	2.5%
Not belted		16.1%	0.7%	1.7%	18.2%	15.9%	3.1%	5.0%	6.0%	5.7%
% Diff		**-31.5%**	**-56.2%**	**-97.6%**	**-73.8%**	**-74.7%**	**-74.7%**	**-65.3%**	**-55.9%**	**-56.6%**

SIDE	Injury	Head	Face	Neck	Thorax	Abdomen	Spine	UX	LX	Total
Belted	**AIS 1**	471,512	650,226	68,610	451,399	152,576	650,328	1,165,322	1,190,160	4,852,394
	AIS 2	73,478	12,866	131	49,526	47,489	19,484	87,598	73,730	364,316
	AIS 3-6	53,092	3,166	53	80,067	12,296	3,783	18,543	33,373	204,463
	AIS 9	2,932	0	6,669	4,100	2,098	0	2,126	130	18,054
Subtotal		**601,014**	**666,258**	**75,463**	**585,092**	**214,459**	**673,595**	**1,273,589**	**1,297,393**	**5,439,227**
Not belted	**AIS 1**	235,213	422,662	15,672	84,124	44,558	152,434	270,194	427,190	1,676,290
	AIS 2	53,295	16,555	173	16,562	26,969	19,794	49,524	45,408	228,280
	AIS 3-6	41,834	3,345	0	55,039	11,363	6,660	5,821	31,174	155,250
	AIS 9	8,526	31	57	1,342	1,038	17	0	0	11,011
Subtotal		**338,868**	**442,594**	**15,902**	**157,067**	**83,928**	**178,905**	**325,539**	**503,772**	**2,070,832**
RISKS										
Belted		10.1%	0.5%	0.1%	15.1%	7.5%	0.6%	1.6%	2.7%	4.0%
Not belted		15.1%	0.8%	0.0%	39.6%	20.3%	4.2%	2.1%	6.8%	8.5%
% Diff		**-33.0%**	**-38.3%**		**-61.9%**	**-63.3%**	**-86.2%**	**-25.7%**	**-59.9%**	**-52.3%**

REAR	Injury	Head	Face	Neck	Thorax	Abdomen	Spine	UX	LX	Total
Belted	**AIS 1**	102,686	119,511	17,470	92,916	26,091	518,755	185,398	237,900	1,319,640
	AIS 2	18,418	313	177	3,315	2,580	4,082	30,208	4,670	63,763
	AIS 3-6	5,942	36	58	3,705	454	2,130	309	1,046	13,790
	AIS 9	2,622	0	86	1,214	266	0	1,299	440	5,928
Subtotal		**129,668**	**119,860**	**17,791**	**101,150**	**29,391**	**524,967**	**217,214**	**244,057**	**1,403,121**
Not belted	**AIS 1**	24,149	49,991	866	14,933	18,048	61,017	37,654	27,658	235,321
	AIS 2	9,651	62	0	458	1,087	1,767	1,148	2,594	16,767
	AIS 3-6	3,136	11	0	699	158	1,089	40	116	5,250
	AIS 9	4	0	215	72	2,370	0	0	0	2,661
Subtotal		**36,940**	**50,064**	**1,081**	**16,162**	**21,663**	**63,874**	**38,843**	**30,369**	**259,999**
RISKS										
Belted		5.5%	0.0%	0.3%	3.8%	1.7%	0.4%	0.2%	0.4%	1.0%
Not belted		11.5%	0.0%	0.0%	4.5%	0.9%	1.8%	0.1%	0.4%	2.2%
% Diff		**-52.4%**	**39.8%**		**-14.3%**	**97.3%**	**-76.7%**	**56.1%**	**4.4%**	**-52.6%**

ROLLOVER	Injury	Head	Face	Neck	Thorax	Abdomen	Spine	UX	LX	total
Belted	**AIS 1**	269,700	451,629	33,296	197,340	52,953	336,576	796,258	494,586	2,674,230
	AIS 2	52,083	15,483	51	19,374	16,466	17,547	46,852	33,941	201,844
	AIS 3-6	28,545	1,026	85	27,873	3,884	8,741	13,983	6,154	90,913
	AIS 9	1,115	0	235	1,688	899	0	0	0	3,937
Subtotal		**351,443**	**468,138**	**33,667**	**246,275**	**74,202**	**362,864**	**857,093**	**534,681**	**2,970,924**
Not belted	**AIS 1**	106,209	289,260	7,420	63,206	38,864	74,118	228,014	185,380	1,020,473
	AIS 2	42,183	20,705	16	5,291	4,649	21,917	23,160	25,342	143,315
	AIS 3-6	26,418	2,186	338	17,844	5,072	6,902	4,891	13,708	77,780
	AIS 9	2,097	51	0	1,341	140	0	57	301	3,988
Subtotal		**176,907**	**312,203**	**7,774**	**87,682**	**48,726**	**102,937**	**256,122**	**224,731**	**1,245,556**
RISKS										
Belted		9.6%	0.2%	0.3%	12.4%	6.8%	2.5%	1.7%	1.2%	3.3%
Not belted		19.9%	0.8%	4.4%	22.0%	11.5%	8.5%	2.1%	6.9%	7.1%
% Diff		**-52.0%**	**-69.8%**	**-94.2%**	**-43.8%**	**-40.8%**	**-70.3%**	**-17.8%**	**-82.2%**	**-53.6%**

Table 5: Unweighted 1993-2000 NASS Injuries by Impact Type, Body Region, Severity and Belt Usage.

FRONT	Injury	Head	Face	Neck	Thorax	Abdomen	Spine	UX	LX	Total
Belted	**AIS 1**	1521	7357	838	5242	1782	2931	7827	8879	36657
	AIS 2	680	460	13	528	485	309	977	2327	5779
	AIS 3-6	855	82	2	887	254	102	421	858	3467
	AIS 9	53	1	4	47	61	3	4	4	177
Subtotal		**3,109**	**7,900**	**857**	**6,704**	**2,582**	**3,345**	**9,229**	**12,068**	**46,080**
Not belted	**AIS 1**	1,969	10,335	293	2,130	637	991	3,932	6,184	26,723
	AIS 2	1,070	730	30	410	544	328	702	2,179	5,993
	AIS 3-6	1,250	104	14	1,253	252	132	375	1,061	4,460
	AIS 9	104	1	1	55	35	1	4	5	206
Subtotal		**4,393**	**11,170**	**338**	**3,848**	**1,468**	**1,452**	**5,013**	**9,429**	**37,382**
RISKS										
Belted		36.0%	1.1%	0.2%	14.5%	12.5%	3.4%	5.1%	8.8%	8.6%
Not belted		38.8%	1.0%	4.6%	37.0%	28.3%	11.8%	8.7%	14.6%	14.3%
% Diff		**-7.3%**	**10.6%**	**-94.8%**	**-60.9%**	**-56.0%**	**-71.4%**	**-41.4%**	**-39.8%**	**-39.6%**

SIDE	Injury	Head	Face	Neck	Thorax	Abdomen	Spine	UX	LX	Total
Belted	**AIS 1**	1512	2836	336	1842	741	1622	3587	4009	16670
	AIS 2	571	135	4	271	512	259	513	867	3133
	AIS 3-6	1014	17	1	1004	192	76	132	467	2906
	AIS 9	37	0	3	29	21	0	3	3	96
Subtotal		**3,134**	**2,988**	**344**	**3,146**	**1,466**	**1,957**	**4,235**	**5,346**	**22,805**
Not belted	**AIS 1**	1015	2478	139	570	254	505	1564	1841	8475
	AIS 2	445	160	6	167	380	220	380	435	2193
	AIS 3-6	989	19	0	794	172	89	99	349	2512
	AIS 9	42	1	1	21	16	1	0	0	82
Subtotal		**2,491**	**2,658**	**146**	**1,552**	**822**	**815**	**2,043**	**2,625**	**13,262**
RISKS										
Belted		40.1%	0.6%	0.3%	35.3%	20.6%	4.5%	3.5%	10.4%	14.8%
Not belted		49.4%	0.8%	0.0%	58.2%	40.4%	15.0%	6.0%	15.9%	22.9%
% Diff		**-18.7%**	**-21.7%**		**-39.4%**	**-49.0%**	**-70.1%**	**-40.4%**	**-34.5%**	**-35.1%**

REAR	Injury	Head	Face	Neck	Thorax	Abdomen	Spine	UX	LX	Total
Belted	**AIS 1**	281	350	51	198	83	1023	452	538	3028
	AIS 2	78	9	2	22	22	51	37	31	252
	AIS 3-6	93	1	1	58	10	23	9	17	214
	AIS 9	11	0	1	4	4	0	2	2	24
Subtotal		**463**	**360**	**55**	**282**	**119**	**1,097**	**500**	**588**	**3,518**
Not belted	**AIS 1**	89	117	10	35	23	139	88	103	612
	AIS 2	25	2	0	6	19	25	10	18	105
	AIS 3-6	57	1	0	25	5	12	3	7	110
	AIS 9	1	0	1	1	1	0	0	0	4
Subtotal		**172**	**120**	**11**	**67**	**48**	**176**	**101**	**128**	**831**
RISKS										
Belted		24.9%	0.3%	1.9%	22.7%	10.8%	2.2%	2.0%	3.1%	6.6%
Not belted		39.0%	0.8%	0.0%	41.7%	17.9%	7.9%	3.3%	6.4%	15.2%
% Diff		**-36.3%**	**-66.4%**		**-45.6%**	**-39.8%**	**-72.3%**	**-40.8%**	**-51.9%**	**-56.7%**

ROLLOVER	Injury	Head	Face	Neck	Thorax	Abdomen	Spine	UX	LX	Total
Belted	**AIS 1**	1098	1940	206	722	291	752	2533	1750	9481
	AIS 2	280	106	1	79	105	166	296	273	1307
	AIS 3-6	315	16	3	241	36	87	96	120	918
	AIS 9	19	0	2	11	8	0	0	0	40
Subtotal		**1,712**	**2,062**	**212**	**1,053**	**440**	**1,005**	**2,925**	**2,143**	**11,746**
Not belted	**AIS 1**	564	1559	63	350	148	337	1177	970	5265
	AIS 2	211	117	1	58	81	157	208	229	1063
	AIS 3-6	338	14	2	238	51	79	61	120	909
	AIS 9	23	1	0	8	6	0	1	2	41
Subtotal		**1,136**	**1,691**	**66**	**654**	**286**	**573**	**1,447**	**1,321**	**7,278**
RISKS										
Belted		22.3%	0.8%	1.4%	25.0%	11.0%	10.4%	3.7%	6.4%	8.8%
Not belted		37.5%	0.9%	3.1%	40.5%	25.6%	19.0%	4.9%	11.0%	14.7%
% Diff		**-40.5%**	**-8.1%**	**-53.3%**	**-38.2%**	**-57.0%**	**-45.4%**	**-25.9%**	**-41.7%**	**-40.0%**

Table 6: 1997-2000 NASS Individual Case Summaries for Belted, Completely Ejected Occupants.

Case	Vehicle	Rollover Info	Roll Type	Occupant	Ejection Area	Injury Severity	Comment
Properly Belted							
1997-011-161	1994 Chevrolet Geo Tracker	Longitudinal Axis, 6 Quarter Turns.	Trip-over	Driver	Roof	MAIS 3	Soft-top roof is believed to have failed, allowing the complete ejection of the restrained driver
1997-008-151	1988 Plymouth Voyager	Longitudinal Axis, 1 Quarter Turn	Trip-over	Driver	Right-front glazing	Fatal	V2 had previously been involved in a collision with the roadway barrier, and was stopped facing sideways in the innermost travel lane. V1 front struck V2 left side, causing V2 to tip over, and the ejection of the front right passenger
1997-041-126	1991 Ford F-Series Pickup	Longitudinal Axis, 5 Quarter Turns.	Trip-over	Driver	Windshield	MAIS 2	Previous event - impact on the rear right quarter panel
2000-011-193	2001 Jeep Wrangler	Longitudinal Axis, 9 Quarter Turns.	Trip-over	Driver	Roof	MAIS 2	Roof of V1 broke off during rollover. Additionally, driver seatback rotated, releasing occupant from belt, and causing a complete ejection.
2000-011-039	1989 Pontiac Grand Prix	Longitudinal Axis, 4 Quarter Turns.	Trip-over	Driver	Front left / opening where vehicle split.	MAIS 4	V1 split in two behind driver's seat
2001-011-011	2001 Ford Focus	Longitudinal Axis, 4 Quarter Turns.	Trip-over	Driver	open (failed) front right passenger door	Fatal	V1 passenger side door failed & opened during rollover
2001-076-105	1999 Jeep Wrangler	Longitudinal Axis, 12 Quarter Turns.	Trip-over	Driver	Unknown	Fatal	Driver seatback rotated, releasing occupant from belt, and causing a complete ejection
Improperly Belted							
2000-013-088	1992 Toyota Tercel	Longitudinal Axis, 4 Quarter Turns	Trip-over	Driver	Driver side front window	MAIS 1	Automatic Shoulder Belt in proper position; Manual lap belt not used.
1999-048-035	1994 Saturn SL	Longitudinal Axis, 11 Quarter Turns.	Trip-over	Driver	Rear window	MAIS 1	Automatic Shoulder Belt in proper position; Manual lap belt may or may not have been used.
1999-012-055	1991 Ford Escort	Longitudinal Axis, 8 Quarter Turns.	Trip-over	Driver	Driver door window	MAIS 2	Shoulder Belt in proper position; Manual lap belt not used
1999-075-105	1988 Ford Escort	Longitudinal Axis, 6 Quarter Turns.	Trip-over	Driver	Right front window	MAIS 1	Automatic Shoulder Belt in proper position; Manual lap belt not used
1999-045-136	1989 Mazda 626	Longitudinal Axis, 6 Quarter Turns.	Flip-over	Driver	Unknown medium (possibly windshield)	MAIS 3	Automatic Shoulder Belt in proper position; Manual lap belt not used. [Shoulder belt latch failed.]
1999-045-202	1975 Jeep	Longitudinal Axis, 4 Quarter Turns.	Fall-over	Driver	Right front door area (door off)	Fatal	Only lap belt available. Used but specified as "other improper use"

Turn-over - When centrifugal forces from a sharp turn or vehicle rotation are resisted by normal surface friction (most common for vehicle with higher cg). The surface includes pavement surface and gravel, grass, dirt and there is no furrowing, gouging at the point of impact. If rotation and/or surface friction causes a trip, the rollover is classified as a turn-over.

Collision with Another Vehicle - When an impact with another vehicle causes the rollover. The rollover must be the immediate result of an impact between the vehicles.

Climb-over - When vehicle climbs up and over a fixed object (e.g., guardrail, barrier) that is high enough to lift the vehicle completely off the ground. The vehicle must roll on the opposite side from which it approached the object.

End-over-end - When a vehicle rolls primarily about its lateral axis (pitch motion).

Using NASS-CDS definitions, Parenteau et al. (2003) found that trip-over rollovers had the highest frequency at 57% for passenger cars and 52% for light truck vehicles (LTV's). It is not surprising that drivers were most seriously injured in trip-overs, followed by a fall-over. When looking at the object contacted, more than 90% of trip-overs resulted after contact with the ground. Though bounce-overs were not frequent, the risk of serious injury was high.

Dummies: The Hybrid III dummy is often used to evaluate occupant kinematics in a rollover (Orlowski et al. 1985, Bahling et al. 1990, 1995). It has been shown to be a useful test device to study occupant kinematics and injury risks in rollovers. However, the dummy was not deigned for the complex 3D loadings that can occur in rollover crashes, so there have been questions of its biofidelity. For example, the Hybrid III neck is stiffer than the human's neck, particularly in compression; and, most of the impact performance requirements involve frontal loading evaluations (Herbst et al. 1998). Also, Steffan et al. (2000) compared the kinematics of a stunt volunteer driver and a Hybrid III dummy in a low-speed roll. The results indicated differences, because there was active movement of volunteers in the rollover. While there has been interest to develop a rollover or omni-directional dummy, no requirements or prototypes are available at this time. For this reason, occupant dynamics models are often used to supplement rollover crash analyses.

Laboratory Tests: At the current time, there are no regulations addressing field relevant vehicle/occupant kinematics in a rollover. In the U.S., the Federal Motor Vehicle Safety Standard (FMVSS) for the 208 dolly test (see SAE J2114) was often used to evaluate occupant kinematics in a rollover. Though this test is no longer a part of the 208 regulation, it has recently regained attention as a laboratory test procedure. The test consists of launching a vehicle into a lateral roll at 30 mph with the Hybrid III driver side leading from a dolly fixture. The vehicle is initially inclined at 23^0 on the 208 dolly and rolls 2 to 5 times during the test.

Historically, the 208 dolly test method was selected as it ensures a vehicle roll. The intent of the test is to investigate the effects of roof strength and the kinematics of belted and unbelted occupants during a rollover. However, the test was found unlikely to represent more than 1% of the field conditions due its severity and the initial launch angle of the vehicle (Orlowski et al. 1985, Parenteau et al. 2003).

In Europe, ADAC (www.adac.de) developed a consumer information test referred to as the "ADAC Corkscrew" or "ADAC ramp test," which consists of rotating a vehicle through 180^0 from a dual-incline ramp. Due to a combination of the height of the full ramp and the selected test speed, the vehicle becomes airborne and lands on its roof. This test was established to assess vehicle roof strength and performance of pillar, and rollbars for convertibles.

Additional laboratory tests have been conducted to evaluate vehicle and occupant responses in various roll conditions. These tests include soil-trip and curb-trip rollovers (Thomas et al. 1989, Cooperrider et al. 1998). Tests have also been conducted where vehicles are tripped by the down slope of a ditch (Bardini, Hiller 1999, DeLeys, Brinkman 1987).

Tripped rollovers have been defined as when the lateral force acting on the wheels/tires has a sufficient magnitude and duration to create an overturning impulse that rotates the vehicle center of gravity past the tripping wheels (Ragan 2000). Tripping mechanisms can be created with curbs, soil, road friction and the FMVSS 208 dolly. Untripped rollovers include ramped guardrail rollovers, two-vehicle collisions and embankment induced rollovers.

Pre-Crash Dynamics: In an analysis of the NASS-CDS database, Parenteau et al. (2001) found more than 50% of rollovers occur on roads with a posted speed limit of $\geq$50 mph ($\geq$80 km/h). Most rollovers take place in clear/non-adverse weather conditions. However, the rate of rollovers was higher in snow. About 50% of the rollover crashes occurred during daylight, and about 30% in the dark with no streetlights. Rollovers were most frequent when the vehicle was traveling forward, also coded as "going ahead".

The rate for rollovers was more than 3 times higher than non-rollovers when the vehicle is going around a bend or a curve. As a result, the majority of rollovers occur off-road, at a rate of 80% for tow-away rollovers and more than 70% of fatal first-event vehicle crashes (Ragan 2000). Only 1.3% of all NASS-CDS tow-away crashes are on-road rollovers. Viano et al. (2003) conducted an in-depth analysis of 63 rollovers and found that vehicles typically lose control, go off road and attempt a recovery after negotiating a curve at high speed, drifting off the

road or avoiding an obstacle in the travel lane. These initial actions start the sequence leading to a rollover.

Pre-Rollover Maneuver Tests: Most rollovers are preceded by a maneuver that leads to vehicle instability. NHTSA has developed a series of dynamic rollover propensity tests that include vehicle characterization maneuvers and untripped rollover propensity maneuvers. Characterization maneuvers were developed to assess essential vehicle handling properties while the propensity maneuvers were developed to produce two-wheel lift for vehicles with relatively higher roll propensity.

Vehicle characterization maneuvers include:

Pulse Steer – This test is performed at a specified vehicle speed where a short duration steering pulse is applied to the wheel and is then returned to 0^{o}.

Sinusoidal Sweep – When the input frequency of a sinusoidal steering input of constant amplitude is applied from a low to a high frequency, typically sweeping from 0.2 Hz to 5.0 Hz.

Slowly Increasing Steer – When the vehicle speed is held constant and the steering wheel angle is slowly increased.

Slowly Increasing Speed – When the steering wheel angle is held constant and vehicle speed is slowly increased.

Vehicle rollover propensity maneuvers include:

J-Turn – This test is a single steer test.

J-Turn with Pulse Braking – When a brake pulse is applied after a single steer input.

Fishhook #1 & Fishhook #2 – These tests are both single steer tests. Each uses a different steering reversal timing and steering rate, including the zero-roll-rate test.

Resonant Steer – This test uses a sinusoidal input, which is based on the vehicle's natural frequency.

Double lane – When the vehicle is driven though a path defined by cones located at specified dimensions and the highest vehicle entrance speed is determined where cones are not knocked over.

Though most rollovers occur off road, rollover propensity maneuvers are tested on road. The thought has been that by improving on-road stability, off-road excursions and rollovers are prevented. Viano et al. (2003) proposed an off-road evaluation of vehicle handling to address the majority of scenarios leading to serious injury rollovers.

Ratings: NHTSA currently uses the Static Stability Factor (SSF) to provide consumer information on vehicle rollover resistance. SSF is part of NCAP and estimates the chance for a vehicle to roll over after striking a tripping mechanism. In 1973, SSF was introduced to NHTSA as a substitute for the dynamic maneuver tests for un-tripped on-road rollovers.

SSF is based on track width and center of gravity measurements (Garrott et al. 1999). More specifically, SSF is the ratio between one half of the track width and the height of the center of gravity above the road. The SSF rating system ranges from 1 to 5 stars where 5 stars means that the risk for a vehicle to rollover is less than 10%, 4 stars has a risk between 10 to 20%, 3 stars has a risk between 20 to 30%, 2 stars has a risk between 30 to 40% and 1 star has a risk greater than 40%. At this time, NHTSA is planning to use SSF and a fish-hook dynamic maneuver to assess the overall rollover propensity of vehicles.

OVERVIEW OF A ROLLOVER SENSING PROGRAM

A multi-disciplinary effort was conducted to define the most relevant tests that reflect real-world rollover crashes and injuries. That work prompted a series of rollover tests, including new procedures in which vehicle and occupant kinematics were studied. Also, each test was simulated in mathematical models to study other parameters and scenarios in rollover crashes. The research involved two phases of rollover and immunity testing with state-of-the-art rate gyro transducers to develop sensing techniques and algorithms to activate safety features in rollovers.

By analysis of field crash statistics (Parenteau et al. 2001), a suite of 10 rollover tests was defined to cover more than 90% of real-world rollover crashes and serious occupant injuries. The development and validation of rollover models enabled parametric study of variations in vehicle mass, inertia and payload characteristics as well as occupant size, seating position, restraint use and protection system to increase the effectiveness of occupant retention and protection. The following provides an overview of the rollover sensing, testing and modeling conducted jointly by Delphi, Saab, GM and Millbrook Proving Grounds.

Background: With 20%-25% of occupant deaths occurring in vehicle rollovers and a majority associated with ejection, there is increasing attention to new safety features that activate in rollover crashes. The issue is heightened in sport utilities, where rollovers are associated with nearly half of the occupant fatalities.

Rollover is an unregulated and highly complex area. The program team was assembled with expertise in safety, testing, electronics and modeling. The first effort was to establish sensing requirements and technical specifications for vehicle testing. The team was formed to determine: (1) the most relevant laboratory rollover tests that reflect real-world rollover crashes, (2) the needs for instrumentation and standardized test methods to conduct repeatable rollover tests, (3) test parameters using PC-Crash and validating the models with laboratory test data, (4) vehicle rollover and occupant kinematics using Madymo simulations, and (5) specifications for the activation of the rollover safety

systems, such as belt pretensioners, side curtains and pop-up rollbars to protect occupants in rollovers.

Scope of the Research Program: The goal of the rollover sensing team was to conduct a comprehensive program to define rollover-sensing requirements for activation of safety systems, such as belt pretensioners, roof-rail airbags and convertible pop-up rollbars. The program involved two separate test series of rollover crashes and immunity driving scenarios to define the roll angle and angular velocity conditions for field rollovers and non-rollover events. Laboratory grade rate gyros measured vehicle dynamics in the rollover tests.

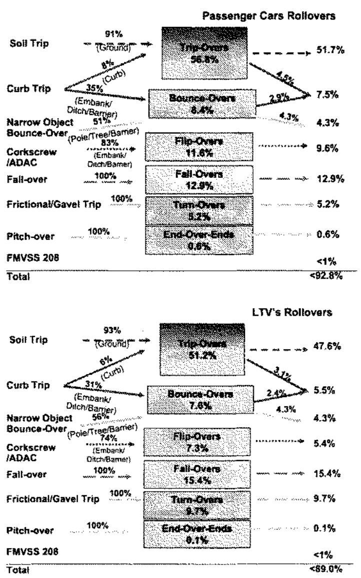


Figure 1a: The key aspects of the rollover sensing program included the use of 9 rollover tests to represent field-relevant rollover injury crashes, 8 are considered in this analysis.

Next, a suite of 9 rollover tests was used to increase the field relevance of the former FVMVSS 208 dolly and ADAC rollover from 10% to more than 90% of field rollovers and serious occupant injury. Finally, the requirements and specifications for rollover sensing algorithms and activation of safety systems were determined.

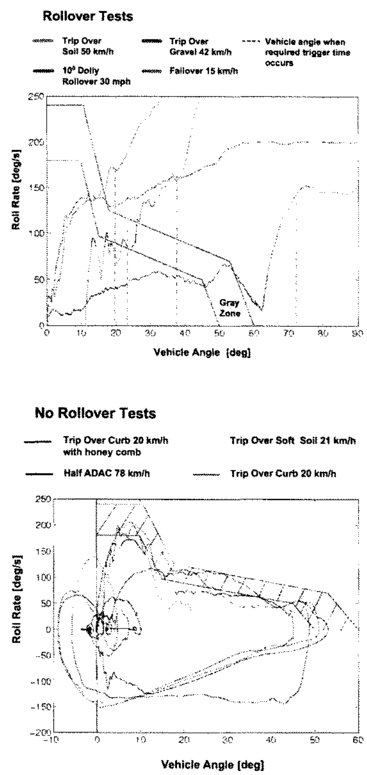


Figure 1b: Measuring vehicle responses in 24 full-scale rollover and non-rollover tests, defining sensor and sensing requirements.

In each test series, a number of steps were followed to: 1) analyze field crash statistics and set priority rollover conditions, 2) define relevant laboratory crash test procedures simulating the important field injury rollovers, 3) set-up and conduct rollover, non-rollover and immunity

tests, 4) analyze the vehicle and dummy responses and establish sensing requirements and 5) develop deployment algorithms that ensure timely system activation, but are immune to extreme driving and non-rollover conditions.

Main Results: When conventional rollover tests were considered at the beginning of the study, they represented less than 10% of the field incidence of serious injury rollovers. This was the motivation to describe other test conditions with real-world relevance to injurious rollover crashes. The study of field crashes involved analysis of databases from crashes in the United States, United Kingdom, Australia and Germany (Parenteau et al. 2001, 2003). This work provided a global perspective on the relevant rollover crashes. As shown in Figure 1a, nine laboratory tests cover 93% of the field incidence of rollover crashes for passenger cars and 89% for LTVs. This addressed 84% of serious injury rollovers.

LATE or Triggered NT
Within 2 loops late
Inside Window
Early

	Min Time	RRAB	WinGAMR		LC1_V	
			MSL	MSH	MSH	MSL
TEST PHASE II	(GZ)	RTTF	WinGAMR_v06	WinGAMR_v06	LC1V_v03	LC1V_v03
ADAC	254	NA	150	140	110	120
Soil Trip 42 km/h	241	282	230	220	240	240
Soil Trip 50 km/h	225	274	210	210	[illegible]	[illegible]
Curb Trip 26 km/h	68	90	[illegible]	[illegible]	80	70
10° Dolly rollover	109	298	[illegible]	[illegible]	220	[illegible]
FMVSS 208 23°	39	189	[illegible]	[illegible]	[illegible]	[illegible]
Fallover Ditch	1603	2142	1340	1330	[illegible]	[illegible]
Gravel Trip 42 km/h	225	304	220	210	[illegible]	[illegible]
Bounce over 42 km/h	264	248	280	280	270	270
Friction Trip 42 km/h	240	368	[illegible]	230	[illegible]	[illegible]
Half ADAC	491	NA	130	120	120	130
Soil Trip 21 km/h	325	NA	NT	NT	340	340
Curb Trip 20 km/h	101	126	[illegible]	[illegible]	[illegible]	[illegible]
Curb Trip 20 km/h (honey comb)	65	110	[illegible]	[illegible]	80	[illegible]
TEST PHASE I						
Soil Trip	223	312	220.5	210.5	[illegible]	[illegible]
Low Speed Curb Trip	92	132	[illegible]	[illegible]	[illegible]	[illegible]
Fast Curb Trip	213	534	210.5	200.5	200.5	210.5
ADAC Corkscrew	229	617	120.5	120.5	[illegible]	[illegible]
Fallover Ditch	2014	3004	[illegible]	[illegible]	[illegible]	[illegible]
FMVSS 208	38	376	[illegible]	[illegible]	[illegible]	[illegible]
ADAC Corkscrew (5 dr)	251	268	130.5	120.5	100.5	110.5
High Speed Curb Trip	242	NT	NT	NT	NT	NT

Figure 1c: Validating triggering algorithms for activation of side curtains and a convertible pop-up rollbar. WinGAMR and LC1V are different algorithm types, and RRAB is roof rail airbag.

Details on the methodology used to determine these fractions are covered in the paper by Parenteau et al. (2001). The data shown in Figure 1a involve three columns of frequencies. The left represents the NASS-CDS rollover categories used to classify rollover crashes and their field prevalence. The middle column represents the type of laboratory rollover crashes considered. The analysis method determined the fraction of real world rollovers that would be addressed by these laboratory tests. The right column is the final fraction of field relevance of the laboratory tests. This includes the frequency of rollover crashes and serious injury of belted occupants. The results have been updated with newer NASS-CDS data, but the main conclusions are the same that a series of rollover tests is needed to cover the majority of real world injuries in field rollover crashes, including conventional and added tests to cover the majority of rollover crash injuries are:

Conventional rollover tests

- 23^0 FMVSS 208 dolly
- 180^0 ADAC rollover

Nine Additional rollover test procedures

- Curb trip
- High friction trip
- 90^0 ADAC rollover
- Soil trip
- Gravel trip
- 10^0 FMVSS 208 dolly
- Critical slide
- Bounce over
- Pitch over

The expertise of staff at the Millbrook Proving Grounds was instrumental in developing test procedures and specifications for the new rollover tests that increased field relevance from 10% to 93% for passenger cars. An emphasis was placed on conducting the tests indoors. Eight of the nine tests were conducted indoors. Many used a carriage that accelerated the vehicle to test speed. At the rollover site, the carriage was decelerated and the test vehicle slid into the rollover condition. In other tests, the vehicle was remotely driven up to speed and into a ramp or dragged toward an inclined ditch. Vehicle kinematics are shown in Figures 2a-h.

Secondly, a series of near-rollover and extreme driving tests was conducted to establish the limits between non-rollovers and rollovers, based on the vehicle roll angle and angular velocity. This transition zone is defined as the gray zone between the two situations. The central region of the lower plot in Figure 1b shows several non-rollovers with responses that helped define the gray zone. The complementary plot above shows actual rollovers. A rollover was defined as the combination of roll angle and angular velocity where the vehicle will eventually exceed 90^0 or a quarter turn.

In many situations, the vehicle needs to roll only 10^0-30^0 when the decision to activate the safety systems must be made, since a rollover will occur if the angular velocity exceeds 100 ^{0}/s. This shows the substantial energy imparted to the vehicle early in many rollovers and the importance of an efficient algorithm. Foremost, there is a need to accurately predict the eventual rollover well before it actually happens so that the activation of safety systems can be started before the vehicle rolls close to its static stability angle, which was about 52^0 for the passenger vehicle tested.

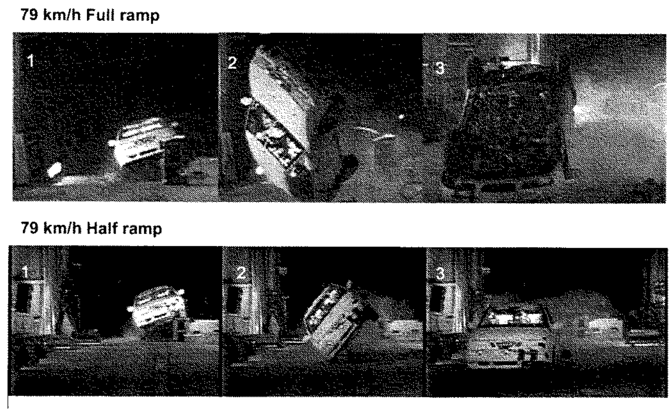


Figure 2a: ADAC corkscrew rollover tests used to define rollover-sensing requirements.

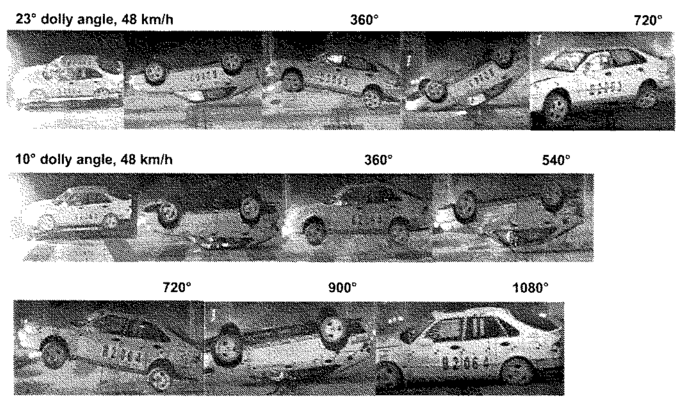


Figure 2b: Dolly rollover test used to define rollover-sensing requirements.

15 km/h with a 50° ditch wall angle

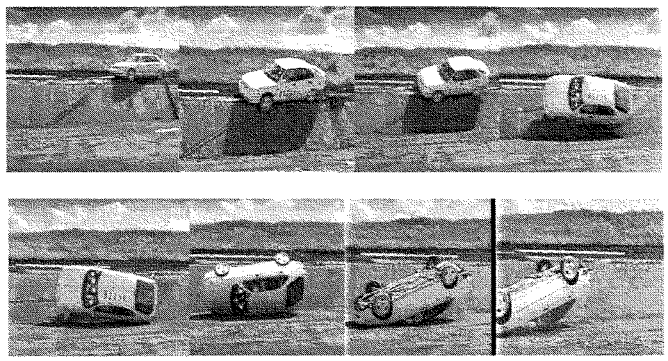


Figure 2c: Fall over ditch rollover test used to define rollover-sensing requirements. The new test relates to real-world crashes involving serious occupant injury occurring in field rollovers.

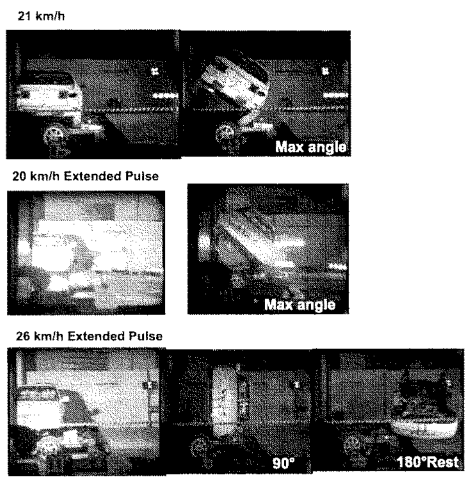


Figure 2d: Curb trip rollover tests used to define rollover-sensing requirements.

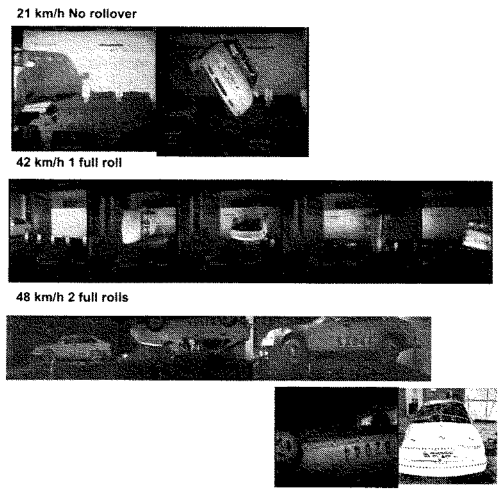


Figure 2e: Other trip over tests used to define rollover-sensing requirements.

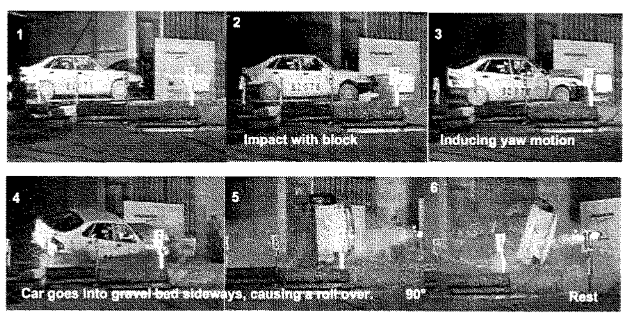
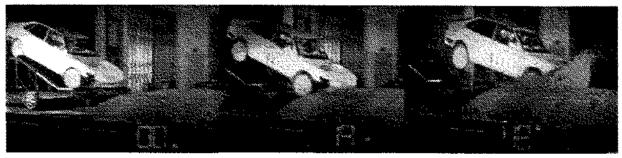


Figure 2f: Bounce over test involving an offset frontal impact into a barrier and then rollover into soft soil.

No pitch over at 30 km/h



No pitch over at 49 km/h

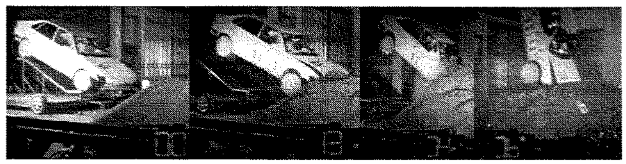
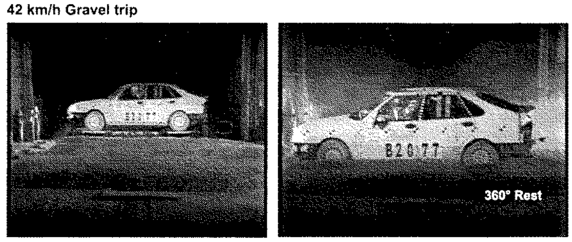


Figure 2g: Pitch over soil test used to define rollover-sensing requirements about a lateral pitch axis.

42 km/h Gravel trip



42 km/h Frictional trip

Figure 2h: Other trip over tests used to define rollover-sensing requirements using gravel and ground friction.

More than 125 different immunity tests were also conducted in the research program using a range of extreme driving and non-rollover testing. The first series of tests included a complete battery of frontal airbag immunity tests. In the second series, new immunity tests were designed to simulate extreme driving conditions and "spirited driving," which provided vehicle responses at the extreme limits of expected field exposure for the rollover sensing system. The tests included:

- Flat high-g turns
- Highway pavement drop-offs
- Steep cross slope driving
- Pike's Peak descent
- Zero-steer banked turns
- Bottoming out with a turn
- Parking lot donut turns
- Airborne events and jumps

The test vehicles were instrumented with a wide array of transducers to capture the rollover, non-rollover and extreme driving responses. Redundant vehicle sensors were used to measure the vehicle rotational velocities in the roll (rotation about the longitudinal axis of the vehicle), yaw (rotation about a vertical axis) and pitch (rotation about lateral axis) directions. In some conditions, mathematical simulation was used to assess immunity performance and setup test parameters.

The sensors were placed in the typical locations for the electronic hardware in European and U.S. vehicles, so relevant data for each region was captured in the tests. The vehicles were also instrumented with accelerometers to complete the information needed for rollover sensing and safing functions. The accelerometers are needed to establish the baseline angle of the vehicle, since the rate gyro only gives the change in vehicle angle.

For the crash tests, the vehicles were also fit with instrumented Hybrid III crash test dummies that were lap-shoulder belted in the driver and front-passenger seats. Left-drive vehicles were used. Off-board and on-board cameras were used to visually capture the occupant and vehicle motion. Placement of the off-board cameras was determined from the mathematical simulations of each rollover test to assure that the critical dynamics of the rollovers were obtained on video. In this regard, the mathematical simulations predicted the sliding and rolling performance of the vehicle prior to the rollover, and then the number of eventual turns (Steffan 2004). For example, the mathematical simulation tools were used to setup the initial velocity and design of the ramp used in the quarter turn ADAC rollover test.

The transducer and visual responses from the testing were used to develop sensing requirements and algorithms for system deployment and safing (Figure 1c). These findings are discussed in a companion paper by Schubert et al. (2004). For the roof-rail airbag, the on-board video was studied to determine the lateral motion of the dummy's head in the nearside seating position. This is the location of the dummy closest to the first roll and involves motion towards the door because the vehicle is decelerating as it rolls. This causes outboard displacement of the head. For the roof-rail airbag, it was determined that the sensor must activate the system and have it deployed before the dummy's head reaches the window frame. This requirement assures that the roof-rail airbag is in position before the head reaches a lateral displacement where the curtain may deploy inboard of the head. For the pop-up rollbar, the sensor must activate the system so it is in place when the vehicle rolls to 90^0. This requirement is based on the time necessary to move the rollbar up into position before the vehicle rolls onto the roof. These requirements are specific for the type of vehicle tested and technology used; however, the approach is generic and can be applied to other vehicles.

Throughout the program, mathematical simulation was used to assure robust testing, sensing and algorithms. The mathematical models were applied to each specific test condition, validated and used for evaluation of parameters influencing rollover sensing requirements. The simulations were found to be robust representations of a vehicle rollover. Two simulation tools were used: PC-Crash, which simulates vehicle dynamics and the rollovers, and Madymo, which simulates occupant kinematics in the vehicle. Madymo allows the quick study of various safety systems to prevent ejection and interior impact injury. Figure 3 shows an example of Madymo simulation of the high-speed curb trip, and PC-Crash simulation of the ADAC ramp jump and fall over tests. Excellent comparability was demonstrated between the tests and simulation.

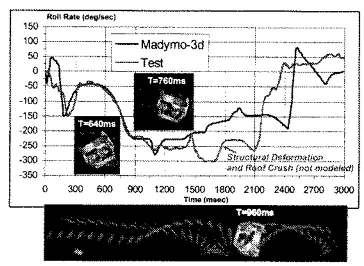


Figure 3a: Comparison of test results and Madymo modeling of the high-speed curb trip.

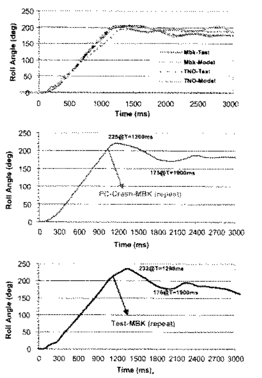


Figure 3b: Comparison of test results and PC-Crash modeling of the ADAC cork screw test.

The rollover-sensing program used both experimental testing and mathematical simulation in a complementary fashion with the aim of eventually validating rollover-sensing requirements in mathematical models using known vehicle characteristics (e.g., mass, center of gravity, moment of inertia, etc.). Thus, this program was planned as a one-time endeavor to establish sufficient knowledge to make further development efforts flow smoothly in simulation. The program used a six-step process for each of the experimental test series:

Step 1: Analyze rollover statistics to determine the type, incidence and injury occurring in the field crashes.

Step 2: Develop rollover mathematical models using PC-Crash (a crash reconstruction model) and Madymo (an occupant dynamic model) to simulate relevant field rollover, non-rollover and extreme driving conditions in laboratory and test environments.

Step 3: Develop laboratory tests and uniform test specifications for rollover (and non-rollover) tests that simulate a majority of the field conditions associated with serious injury.

Step 4: Determine sensing requirements for all-fire, gray zone and no-fire triggering of belt pretensioners, roof-rail airbags and convertible pop-up rollbars.

Step 5: Develop vehicle-based triggering algorithms and safing function using a roll-rate gyro and accelerometers linked to an electronic fire-control module.

Step 6: Verify robustness of the sensing algorithms for vehicles of different mass, cg height, wheelbase and payload using the validated mathematical models.

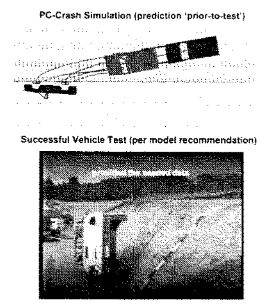


Figure 3c: Comparison of test results and PC-Crash modeling of the fall over ditch test.

Early in the program, the team determined that none of the currently available crash reconstruction mathematical simulation tools had been used or validated to simulate rollover conditions representing all of the real-world crashes that were performed in the Millbrook PG testing. Process improvements were realized by engaging the developer of PC-Crash to work with the team to simulate a series of real-world rollovers that should be duplicated in the laboratory testing. The model was used to not only simulate real-world rollovers, but also to establish the impact speed and driving conditions for the nine rollover tests used by the Millbrook PG team. The models were validated and then used to verify the robustness of the defined sensing algorithm for variations in vehicle design characteristics and cargo payload.

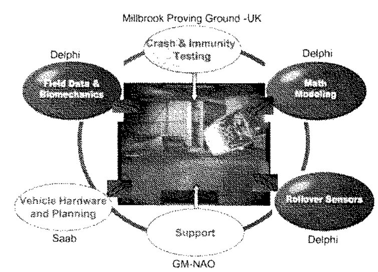


Figure 4: Summary of the key elements in the rollover-sensing program.

One of the important analytical tools used was the statistical analysis of field crash data to determine the priority types, incidence and serious injuries occurring in field rollovers (Parenteau et al. 2001, 2003). This analysis laid the foundation for the selection of real-world crashes for reconstruction with the mathematical simulation tools and then for the development of laboratory test conditions that simulated field crashes. The statistical analyses included databases from Europe and the U.S. and formed one aspect of the overall rollover-sensing program as shown in Figure 4.

The key results of the research program are:

(1) Nine rollover tests were used to cover the majority of field rollovers. The tests give a necessary and sufficient set of data on the vehicle responses in a rollover, including the timing of events that allowed the specification of sensor hardware and algorithms. The tests were complemented by a series of non-rollovers and extreme driving situations to assure no inadvertent activation of the safety systems in real vehicle use.

(2) Requirements were established for the activation of belt pretensioners, roof-rail airbags and pop-up rollbars that provide added safety in rollover crashes. The developed logic is generic for specifying algorithms used in vehicles with rollover safety systems.

(3) Specifications for rollover sensing were set by analyses of real-world crashes and injuries in the U.S. and Europe and selection of essential crash conditions. This assured that the activation of safety systems and specification of requirements had real-world relevance.

(4) Mathematical simulation was used to assure that the sensing and algorithms were robust for a wide range of vehicle mass, cg height, payload and tire/suspension conditions. This improved the implementation of rollover sensing and robustness of the systems. The implementation was based on testing and analysis of sensing requirements determined in the program.

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The rollover sensing activity involved engineers from Saab Automobile AB, the Millbrook Proving Grounds, GM R&D Center and Delphi Automotive Systems. The contributions from many individuals at each organization are greatly appreciated.

This overview provides a summary of a research program on rollover sensing. It is also the first Chapter in a SAE book "Rollover Crashes: Vehicles, Occupants and Injuries." The book includes additional Chapters and reprinted technical papers that cover the topics highlighted here in much more detail. This overview only addresses the main facets of the program and rollover crashes in general. More detail can be found in book.

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REPEATABLE DYNAMIC ROLLOVER ROOF TEST FIXTURE

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ABSTRACT

Experimental rollover tests have been criticized for their poor emulation of actual rollovers and for their lack of repeatability. We have designed and built a test fixture that overcomes both of these criticisms. The fixture holds a passenger compartment, weighted to match the inertia characteristics of a complete vehicle, or a complete vehicle at the appropriate pitch and yaw. The compartment is then rotated about its principal (longitudinal) axis through an arc that mimics the rolling motion of an entire vehicle. At the appropriate roll angle and falling velocity, the roof strikes a moving patch of concrete. The compartment is controlled throughout the sequence and is suspended after the impact, so that a sequence of impacts can be individually studied in separate tests. Initial tests have shown that we can achieve repeatable impacts. Test variables include pitch, yaw, roll rate and vehicle center of gravity motion (both lateral and vertical velocity). This test device addresses the various shortcomings of previous rollover tests, fixtures and the various static and drop tests of vehicles conducted to determine rollover performance.

INTRODUCTION

One-third of all light vehicle fatalities and severe injuries occur in rollovers. A majority of these injuries and fatalities result directly or indirectly from the failure of the occupant compartment to prevent intrusion allowing ejection and causing injurious contacts. Roof strength is currently governed by a completely ineffective standard that quasi-statically tests only one side of the roof structure (Kahane, 1989 and Friedman and Nash, 2003).

A new set of roof strength tests, including a new dynamic test procedure, is needed for several reasons. (1) NHTSA must upgrade the existing quasi-static Federal Motor Vehicle Safety Standard, FMVSS, 216 to ensure adequate roof strength to protect occupants in multiple rollovers. (2) NHTSA needs to address the contribution of the windshield to roof strength. (3) NHTSA must address the effects of friction between the ground and the vehicle roof. (4) Any new regulatory or consumer information tests must be repeatable. (5) NHTSA must have a means of evaluating rollover injury and ejection potential including alternative systems such as window curtain air bags and safety belt pretensioners.

DESCRIPTION OF THE FIXTURE

We have designed, built and tested a fixture that can be used to evaluate the performance of a roof and of a vehicle's rollover occupant protection system under highly controlled, dynamic conditions. Those conditions have been generally specified by analysis of the catastrophic injury impacts of the Malibu series of experiments (Orlowski, et al., 1985, Bahling, et al., 1990 and Friedman and Nash, 2001). The device can combine well-defined vertical, lateral and roll impact conditions with vehicle rotation in a single impact.

Tests with this device will be less expensive than dolly rollover or CRIS tests, but will be more representative of real world rollover conditions, repeatable and objective. The device can be used for vehicle and safety systems development, for consumer information testing and for regulatory purposes.

The device, shown in Figure 1, holds the ends of either a body-in-white or a complete vehicle between two arms that permit it to be rotated about its longitudinal axis. The control arms and their mounting points on the vehicle can adjust the pitch and yaw angles of the vehicle at the time of the roof impact.

The impact surface moves horizontally, along tracks, below the suspended vehicle. An energy source similar to that used in an impact sled propels it. In the test sequence, the vehicle is positioned in the control arms at the appropriate pitch and yaw angles. It can be rotated at up to about 1 revolution per second.

The rotation is coordinated with the release of the control arms in which it is suspended and with the propulsion of the road plate (the impact surface) so that the vehicle body strikes the road plate at a specified roll angle. After the vehicle is released, only its lateral motion continues to be controlled by the control arms except that the vehicle's vertical motion is halted before it strikes the tracks along which the impact surface moves.

The test may be designed to permit impacts with both sides of the roof in a single test. The road plate is moving at a speed of up to about 20 mph (32 km/hr) and will move out from

under the vehicle after the impact or impacts. Note that the inertial frame of reference for this test moves at the speed of the impact surface at the time of the initial roof contact.

After the vehicle impact, it will be suspended by the control arms as its rotation ceases without further vehicle impacts. Using a weighted body-in-white permits tests with production structures at substantially increased rollover strength to weight ratios.

If it is desired, a second impact can be staged on the same vehicle. The impact surface is returned to its initial position, the arms are raised, and the parameters are adjusted appropriately. The test with altered impact parameters can then be repeated.

Instrumentation and cameras can record the results of the test. Test dummies can be used to assess and measure the total performance of the rollover occupant protection system, or a simpler test setup can be used to measure the dynamic roof crush and intrusion.

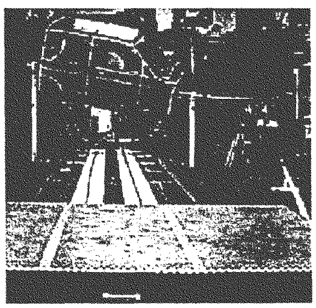

Figure 1: Dynamic rollover test device.

TEST RESULTS

The initial tests utilized a 1987 Chevrolet S-10 Blazer buck held at 10° of yaw and 10° of pitch. The vehicle weight was reduced to 2000 pounds and the roof was strengthened by wood cross bracing under its front corners. The vehicle was rotated at 188 degrees per second and dropped from a height of 4 inches. The leading roof rail contacted the concrete near the front edge. Because of its rebound there was no second contact with the trailing side roof rail. The initial test was instrumented with tri-axial accelerometers under the roof corners and was observed using normal and high speed video cameras. The vehicle did not have test dummies.

An important parameter of the vehicle is the Strength to Weight Ratio, which is a measure of the vehicles roof strength to the weight of the car (Friedman and Nash, 2001). By altering the weight of the buck, the strength to weight ratio can be modified to allow simulation of a production vehicle and a vehicle with either a strengthened or weakened roof.

In this case, the first test was weighted to approximate 60 percent of the weight of the vehicle. Particularly with the internal bracing, this test approximated the response of a reinforced roof. Despite the bracing and the reduced vehicle weight, the roof deformed approximately 3 inches in the impact and the windshield broke.

CONCLUSIONS

Initial testing indicates that the fixture is robust and performs as it was designed to perform. The results were realistic and repeatable, and provide an excellent means for evaluating vehicle rollover performance. We expect that the device will have a wide range of automotive safety applications including regulatory testing, consumer information testing, vehicle and component development testing and research. This fixture is an improvement in its representativeness, repeatability and low cost over existing rollover testing methods.

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